New ACLS Guidelines

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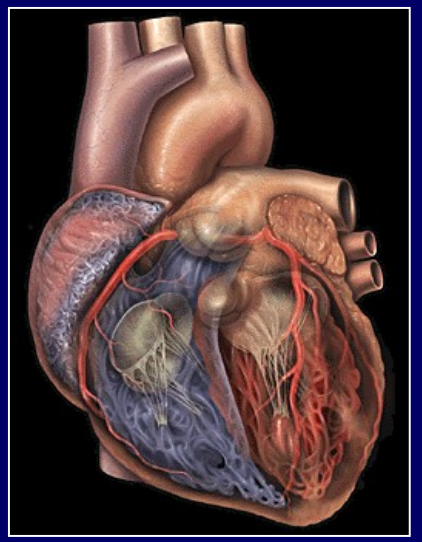
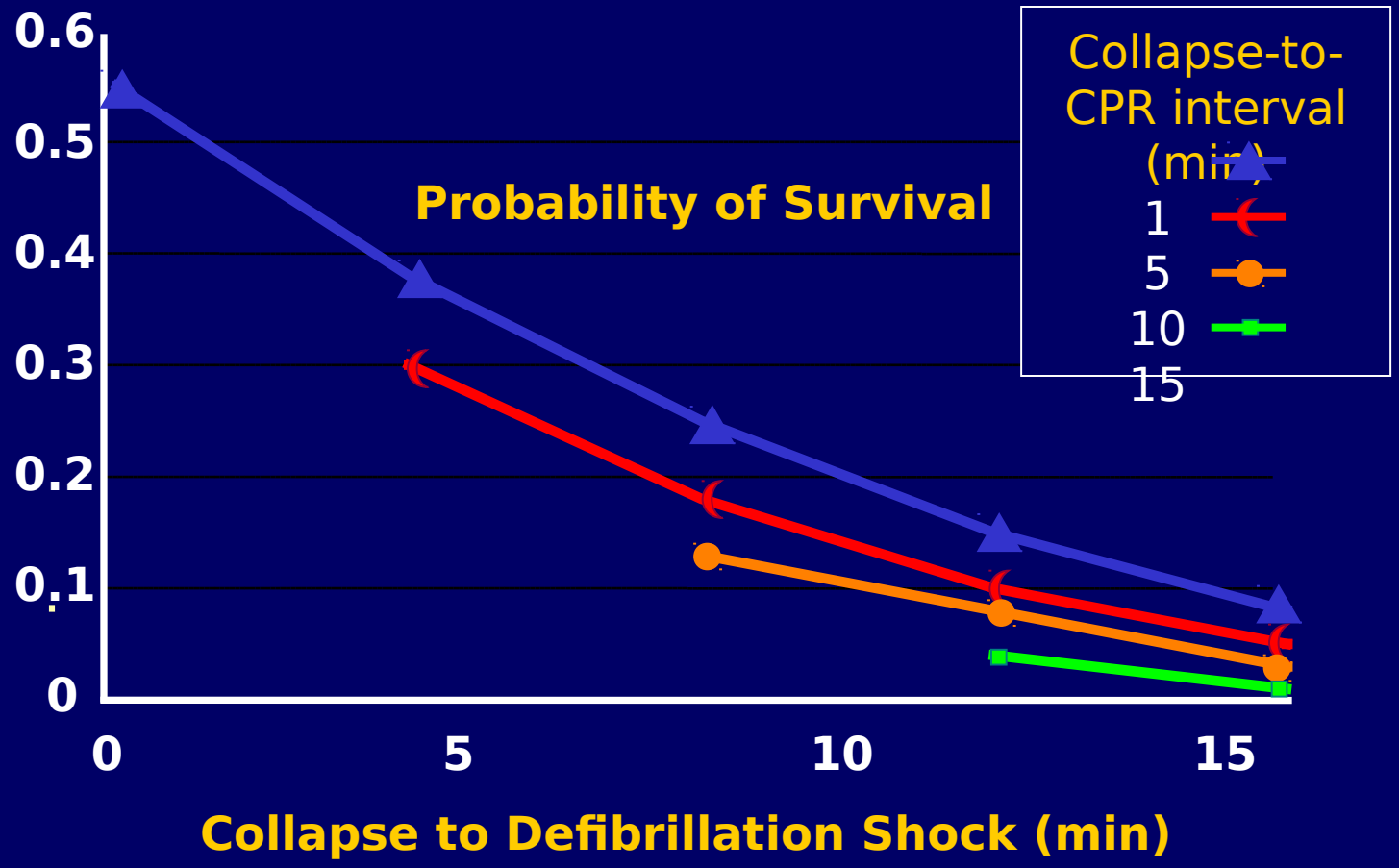


Objectives

- New ACLS algorithms
- Highlight changes in drug therapy
- Review some of the evidence for the changes

Relation of Collapse-to-CPR and Defibrillation to Survival



Valenzuela et al. *Circulation* 1997;96:3308.

ACLS

ACLS

- Drugs/Algorithms

ACLS

- Drugs/Algorithms
- ACS

ACLS

- Drugs/Algorithms
- ACS
- Stroke

ACLS

- Drugs/Algorithms
- ACS
- Stroke
- Electrolyte Abnormalities

ACLS

- Drugs/Algorithms
- ACS
- Stroke
- Electrolyte Abnormalities
- Toxicology

ACLS

- Drugs/Algorithms
- ACS
- Stroke
- Electrolyte Abnormalities
- Toxicology
- Environmental

ACLS

- Drugs/Algorithms
- ACS
- Stroke
- Electrolyte Abnormalities
- Toxicology
- Environmental
- Asthma

ACLS

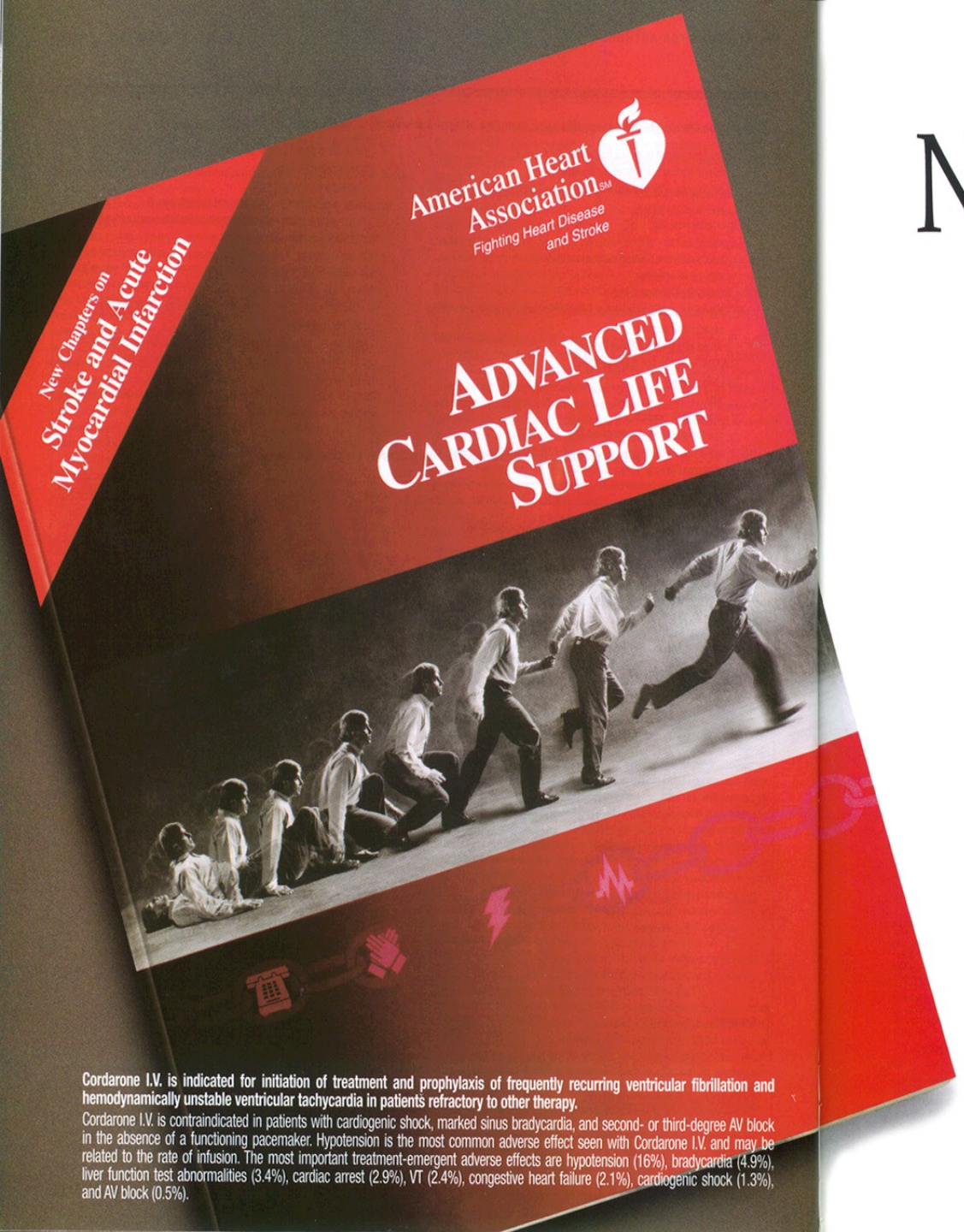
- Drugs/Algorithms
- ACS
- Stroke
- Electrolyte Abnormalities
- Toxicology
- Environmental
- Asthma
- Anaphylaxis

ACLS

- Drugs/Algorithms
- ACS
- Stroke
- Electrolyte Abnormalities
- Toxicology
- Environmental
- Asthma
- Anaphylaxis
- Trauma

ACLS

- Drugs/Algorithms
- ACS
- Stroke
- Electrolyte Abnormalities
- Toxicology
- Environmental
- Asthma
- Anaphylaxis
- Trauma
- Pregnancy



Cordarone I.V. is indicated for initiation of treatment and prophylaxis of frequently recurring ventricular fibrillation and hemodynamically unstable ventricular tachycardia in patients refractory to other therapy.

Cordarone I.V. is contraindicated in patients with cardiogenic shock, marked sinus bradycardia, and second- or third-degree AV block in the absence of a functioning pacemaker. Hypotension is the most common adverse effect seen with Cordarone I.V. and may be related to the rate of infusion. The most important treatment-emergent adverse effects are hypotension (16%), bradycardia (4.9%), liver function test abnormalities (3.4%), cardiac arrest (2.9%), VT (2.4%), congestive heart failure (2.1%), cardiogenic shock (1.3%), and AV block (0.5%).

Now before lidocaine

Cordarone I.V.—Now first-choice antiarrhythmic for persistent VF/pulseless VT in the ACLS guidelines[1]

A critical appraisal of the scientific literature has led the AHA's Emergency Cardiovascular Care Committee to reconstruct the algorithms used to care for critically ill patients. The newly issued evidence-based 2000 ACLS guidelines recommend the administration of Cordarone I.V. before lidocaine for resuscitation from cardiac arrest due to persistent VF/pulseless VT: "...[the] evidence supports the use of IV amiodarone, following epinephrine, to treat shock-refractory cardiac arrest due to VF or pulseless VT."[1] Cordarone I.V. received the highest classification given to any antiarrhythmic agent in the persistent VF/pulseless VT algorithm—IIB—whereas lidocaine was classified as "indeterminate."[1]

Numerous studies—the largest clinical database of any I.V. antiarrhythmic agent—provided strong evidence of the clinical benefit of Cordarone I.V. As part of the evaluation process, significant attention was focused on the ARREST* trial. This unique study established that the administration of ***Cordarone I.V. (300 mg I.V. push) before lidocaine,*** in addition to standard ACLS measures, resulted in the resuscitation of 29% more patients.[2]

The addition of Cordarone I.V. to the ACLS guidelines represents a significant change in the management of cardiac arrest, wherever it may occur. This fact has already been recognized by the many hospital and EMS systems nationwide that have already made Cordarone I.V. part of their lifesaving armamentaria.

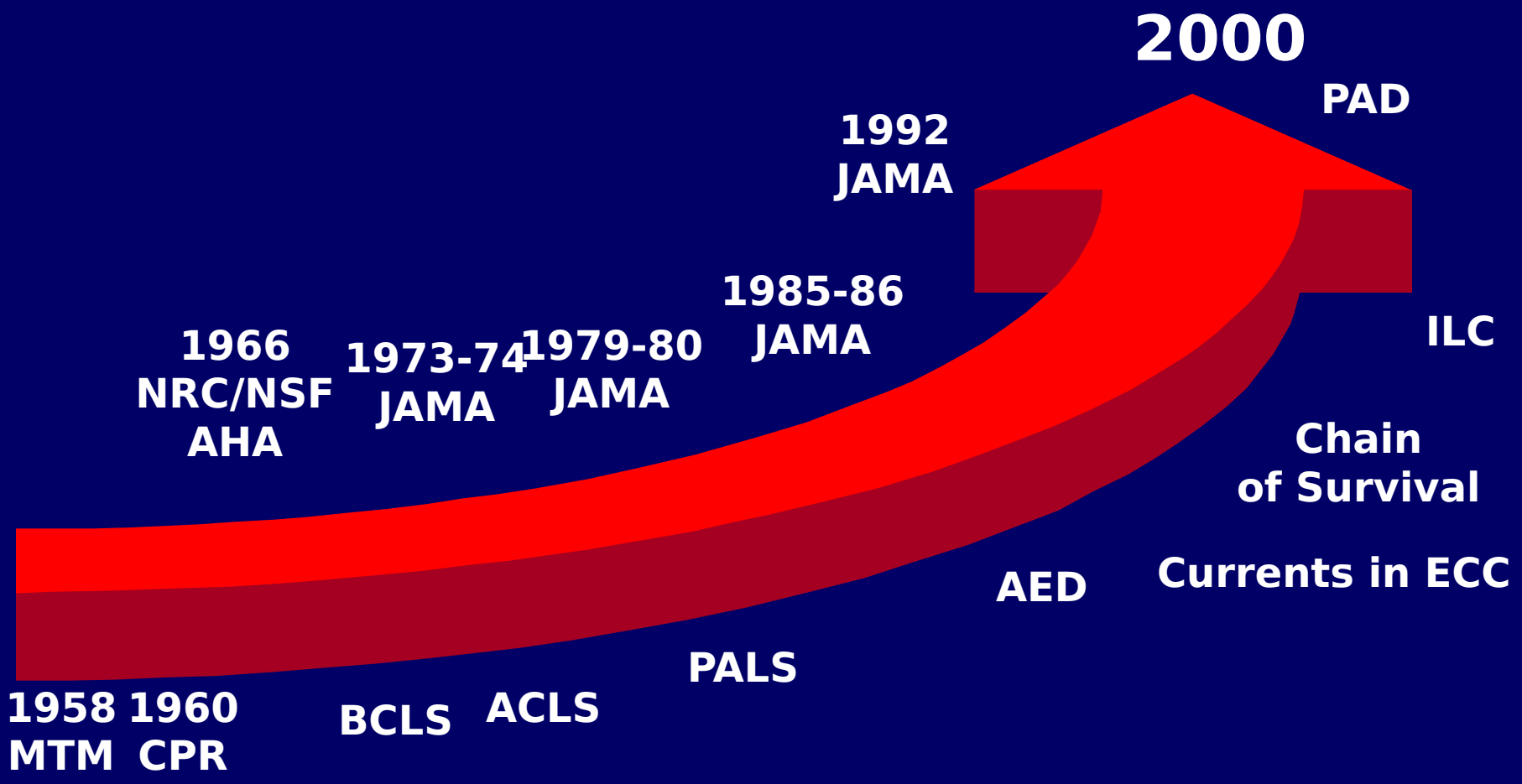
Cordarone® (amiodarone HCl) **I.V.** 150 mg/3 mL

Before lidocaine.

Please see adjacent brief summary of Prescribing Information.

*Amiodarone in Out-of-Hospital Resuscitation of REfractory Sustained ventricular Tachyarrhythmias

AHA ECC Milestones



Linking AHA Evidence-Based Guidelines to ACLS Treatment Recommendations

EVIDENCE

- Level 1: large randomized clinical trials
- Level 2: smaller randomized clinical trials
- Level 3: prospective, controlled, nonrandomized cohort studies
- Level 4: historic, nonrandomized cohort or case-control studies
- Level 5: case series, no control group
- Level 6: animal or mechanical model
- Level 7: extrapolations from existing data; theoretical analyses
- Level 8: rational conjecture (common sense); common practice

QUALITY

- Excellent
- Good
- Fair
- Poor

RECOMMENDATION

- Class I
- Class II
  - Class II a
  - Class II b
- Class III
- Indeterminate

AHA Class Recommendations

	CLINICAL DEFINITION	REQUIRED LEVEL OF EVIDENCE
Class I ***Definitely recommended.*** --**Excellent** evidence--	Always acceptable, safe, definitely useful, proven in both efficacy & effectiveness,	One or more **Level 1 studies**, study **results consistently positive** and compelling
Class IIa ***Acceptable*** --**Good** evidence--	Safe, acceptable, clinically useful, **considered Rx of choice**	Generally **higher levels of evidence**, results are consistently positive
Class IIb ***Acceptable*** --**Fair** evidence--	Safe, acceptable, clinically useful, considered optional or **alternative treatments**	Generally **lower or intermediate levels of evidence**, generally, but **not consistently, positive results**
Class III ***Not acceptable.*** --Evidence of harm--	**Unacceptable**, not useful clinically, may be **harmful**	No positive high level data, **some studies suggest or confirm harm**.
Indeterminate ***Not recommended,*** --**Insufficient** data--	Continuing area of research, qualified recommendations	**Minimal evidence**, higher studies in progress, **results inconsistent**, contradictory, results not compelling

AHA Recommendations

- Class I
  - definitely helpful,
  - excellent Level I evidence
- Class IIa
  - acceptable, probably helpful
  - good supportive evidence
- Class IIb
  - acceptable, possibly helpful
  - fair supportive evidence
- Class III
  - not indicated, may be harmful
- Class Indeterminate
  - not recommended
  - insufficient data

Ventricular Fibrillation

OLD

VF/VT

↓

Shock X 3

↓

Epinephrine } Class IIa

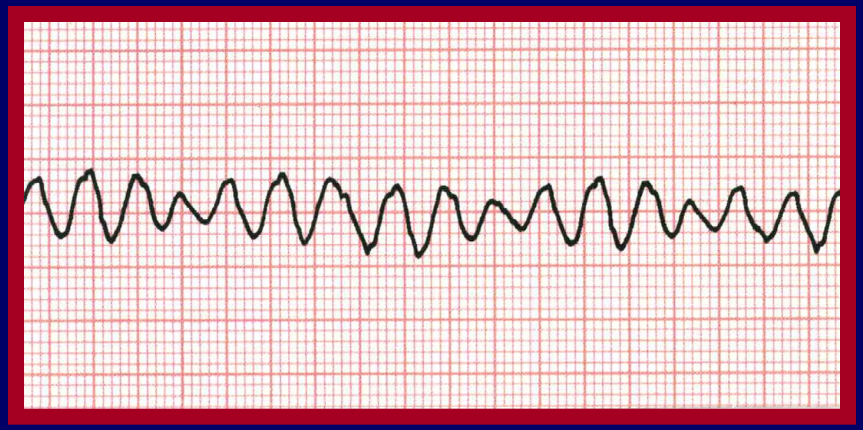
↓

Shock

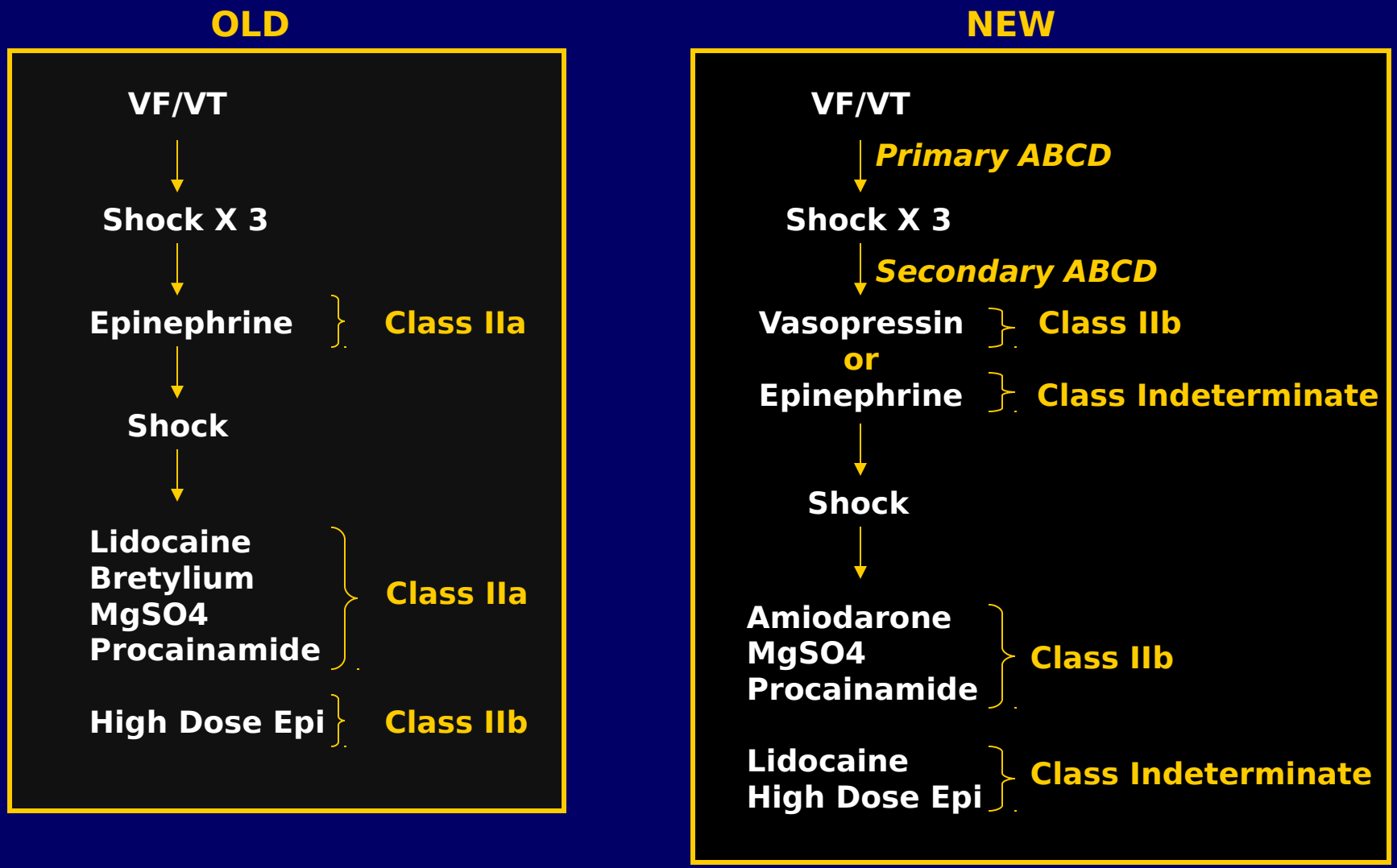
↓

Lidocaine
Bretylium
MgSO4
Procainamide } Class IIa

High Dose Epi } Class IIb



Ventricular Fibrillation

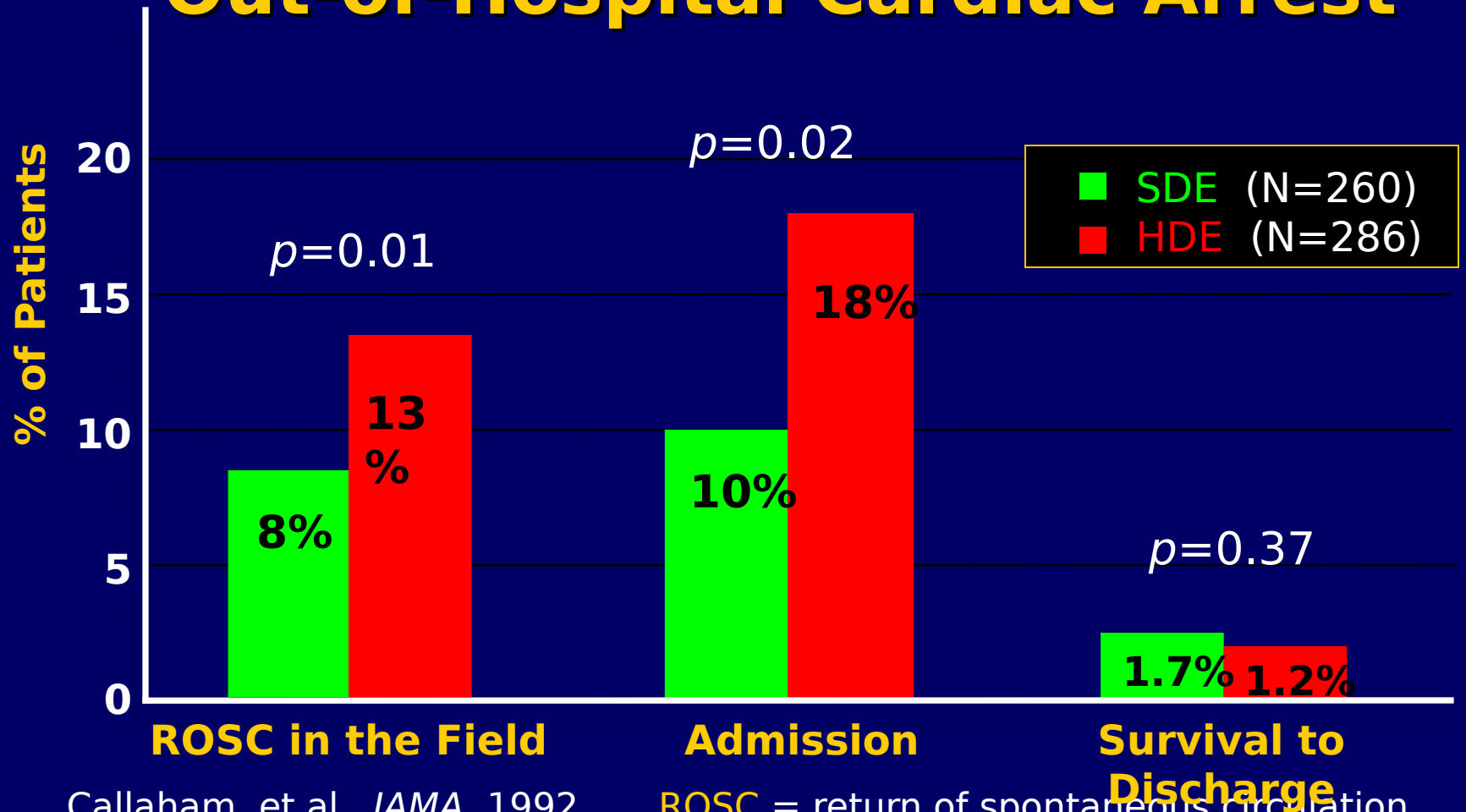


High-Dose Epinephrine

- Stiell, et al. *NEJM* 1992
  - Human, RCT (n=650)
  - Survival and neuro outcomes not improved

- Callaham, et al. *JAMA* 1992
  - Human, RCT (n=816)
  - Increased ROSC and higher admission rates
  - Survival and neuro outcomes not improved

Standard-Dose Epinephrine (SDE) vs High-Dose Epinephrine (HDE) for Out-of-Hospital Cardiac Arrest



Callaham, et al. *JAMA*, 1992

ROSC = return of spontaneous circulation.

High-Dose Epinephrine

- Stiell, et al. *NEJM* 1992
  - Human, RCT (n=650)
  - Survival and neuro outcomes not improved

- Callaham, et al. *JAMA* 1992
  - Human, RCT (n=816)
  - Increased ROSC and higher admission rates
  - Survival and neuro outcomes not improved

- Behringer, et al. *Ann Intern Med* 1998
  - Human, Retrospective cohort study (n=178)
  - Increasing epi dose associated with poorer outcomes

Vasopressin

- Linder, et al. *Anesthesiology* 1992
  - Human, Descriptive Study (n=34)
  - Vasopressin hormone levels are greater in patients with ROSC vs those with no ROSC

- Linder, et al. *Heart* 1996
  - Human, Descriptive Study (n=60)
  - Same result as above

Epinephrine vs Vasopressin

- Linder, et al. *Circulation* 1995
  - Pigs, RCT (n=28)
  - Vasopressin results in higher coronary perfusion pressures

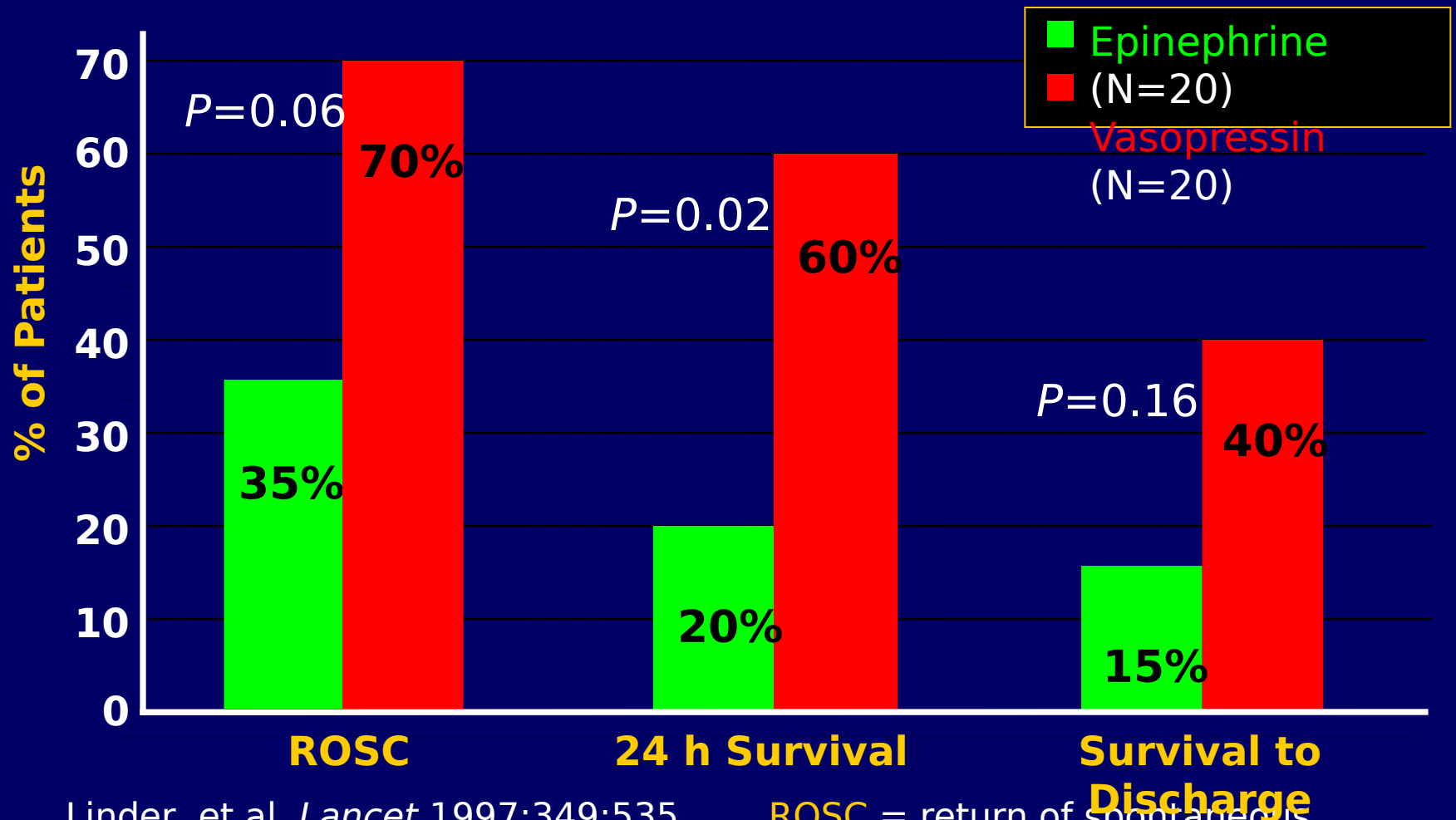
- Prengel, et al. *Crit Care Med* 1996
  - Pigs, RCT (n=16)
  - Vasopressin provided higher SVR and higher MAPs
  - Reversible cardiac depressant effect with vasopressin

- Wenzel, et al. *J Am Coll Cardiol* 2000
  - Pigs, RCT (n=17)
  - Survival: Epi 0/6 (0%) vs Vasopressin 6/6 (100%)
  - Vasopressin group had full neurologic recovery w/o cerebral pathology

Epinephrine vs Vasopressin

- Linder, et al. *Lancet* 1997
  - Human, RCT (n=40)
  - Survival to admission: Epi (35%) vs Vasopressin (70%) p=.06
  - Survival to 24 hr: Epi (20%) vs Vasopressin (60%) p=.02
  - Survival to discharge: Epi (15%) vs Vasopressin (40%) p=.16

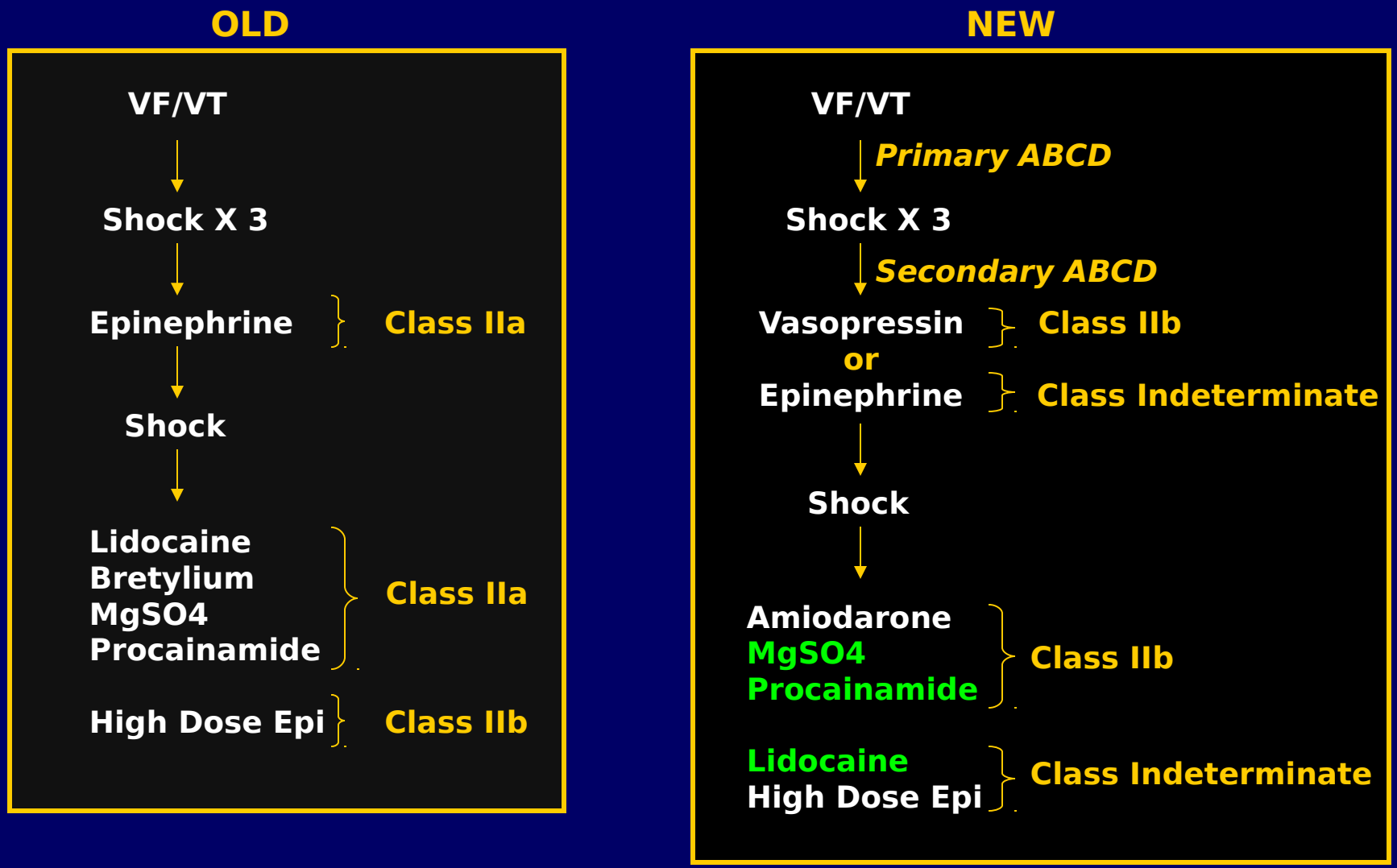
Epinephrine vs Vasopressin for Out-of-Hospital Cardiac Arrest



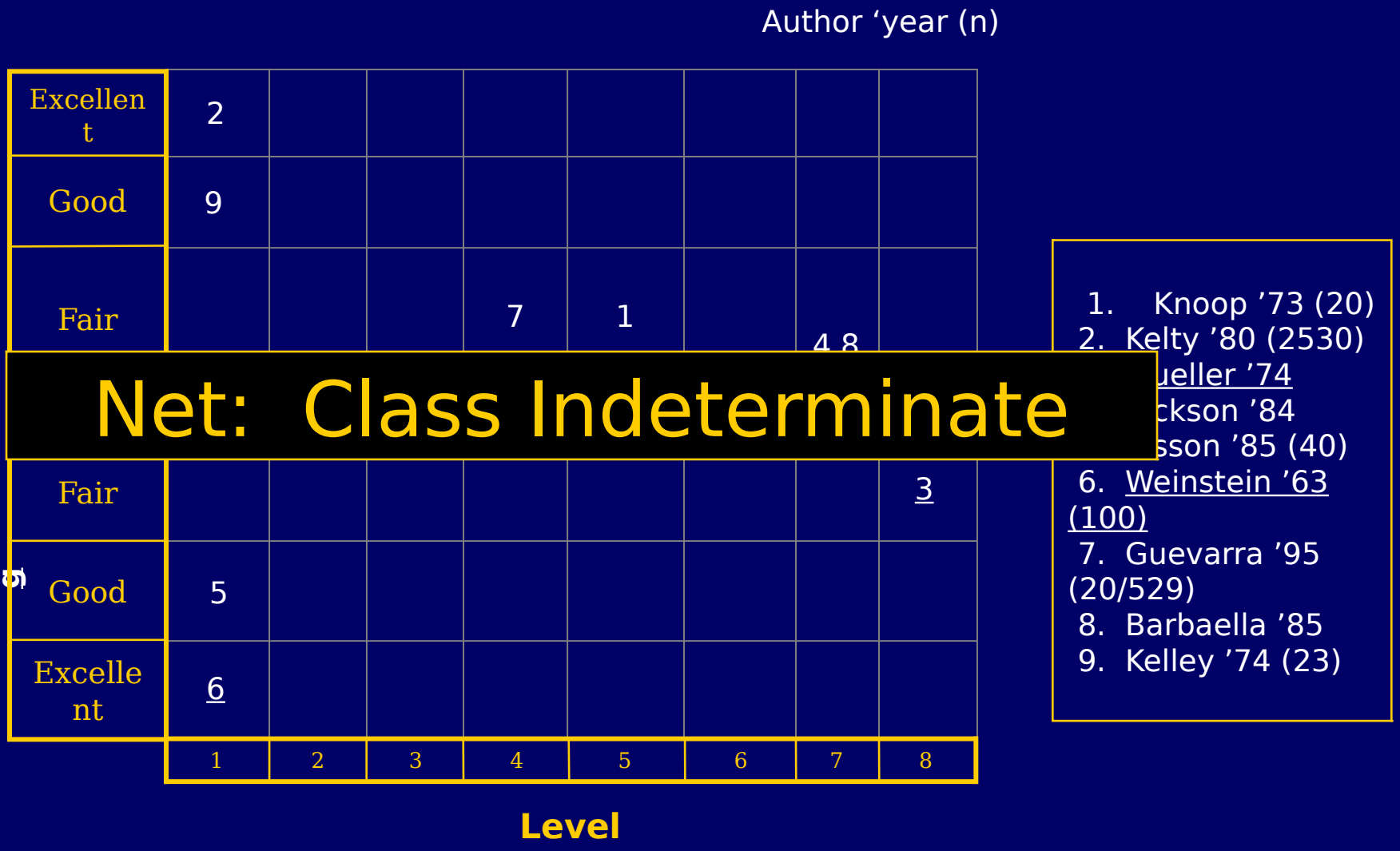
Linder, et al. *Lancet* 1997;349:535.

ROSC = return of spontaneous circulation.

Ventricular Fibrillation



Organization of Evidence for a Particular Intervention



Quality and Level of Evidence Analysis: Magnesium in VF/VT Cardiac Arrest

Author ‘year (n)

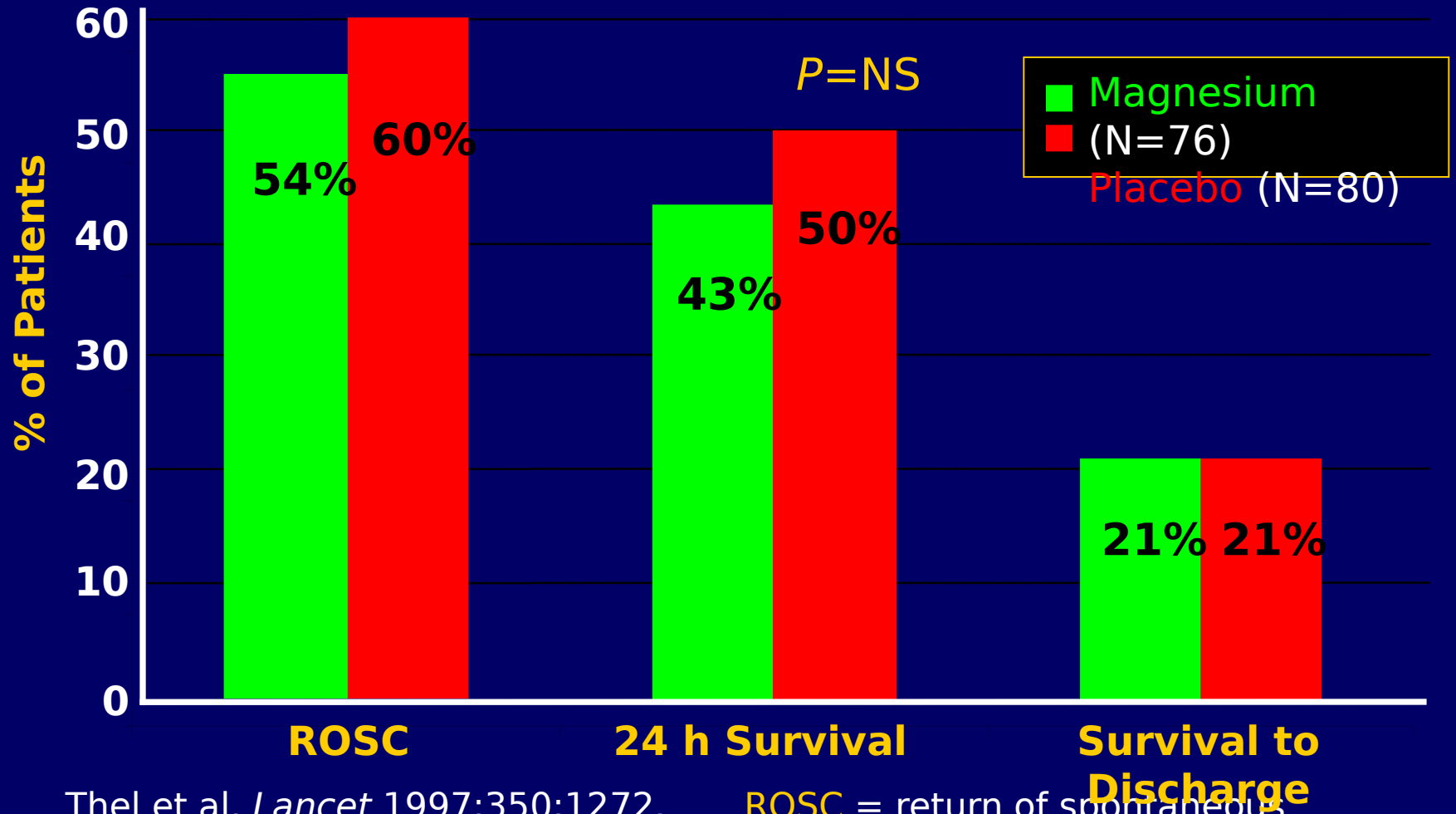
Supporting	1	2	3	4	5	6	7	8
Excellent								
Good								
Fair					3, 5, 6 8		1	

Neutral/Opposing	1	2	3	4	5	6	7	8
Fair				2	7			
Good								
Excellent		4						

Level

1. Cannon ’87(41) (Low Mg)
2. Miller ’95 (62)
3. Perticone ’92 (22)
4. Thel ’97 (156)
5. Tzivoni ’84 (3) (torsade)
6. Tzivoni ’88 (12) (torsade)
7. Tzivoni ’88 (5) (PMVT)
8. Other torsade studies

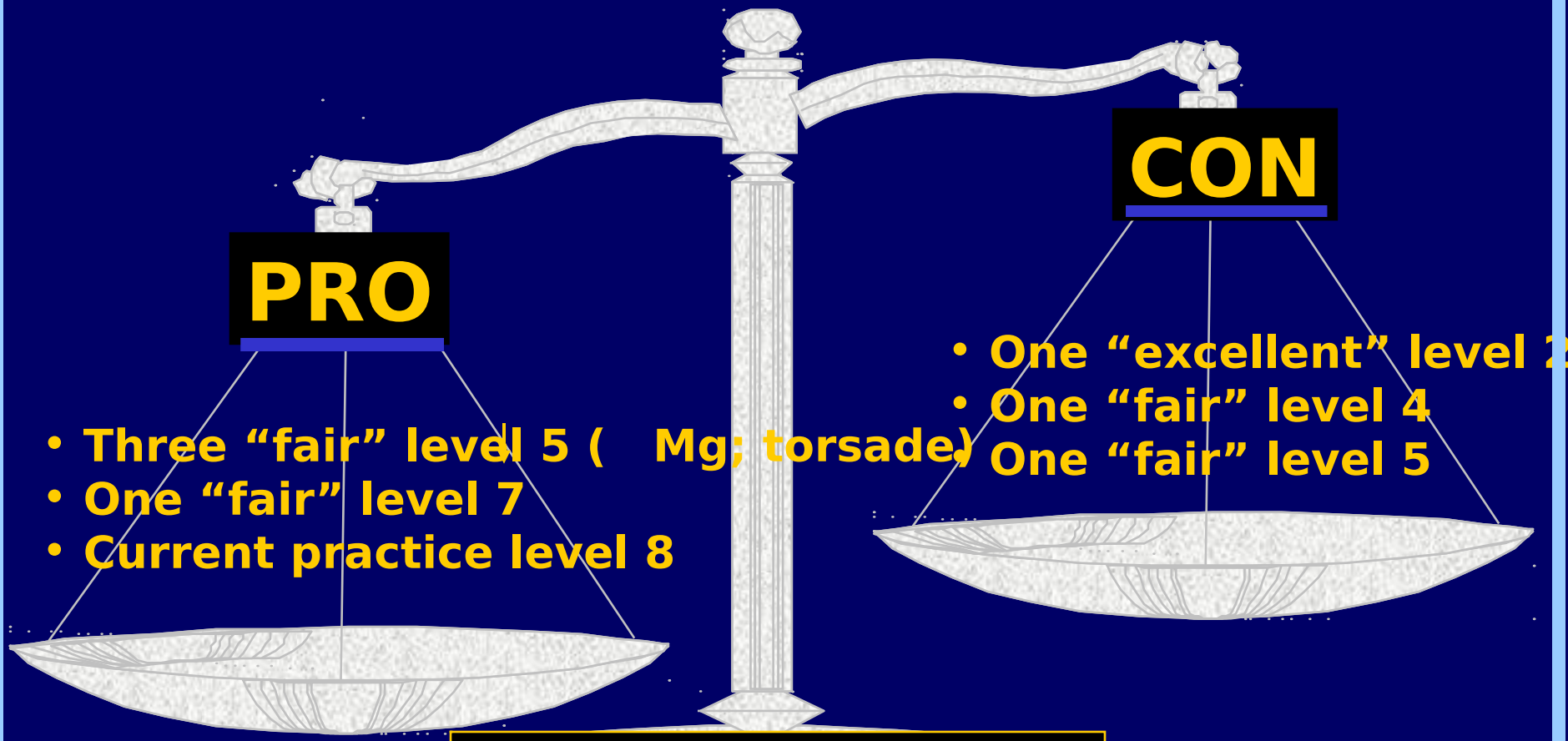
Magnesium for In-hospital Cardiac Arrest



Thel et al. *Lancet* 1997;350:1272.

ROSC = return of spontaneous circulation.

Magnesium in VF/VT Cardiac Arrest


PRO
• Three “fair” level 5 (Mg; torsade)
• One “fair” level 7
• Current practice level 8
CON
• One “excellent” level 2
• One “fair” level 4
• One “fair” level 5

Net: Class IIB (low Mg level)
Unclassified (routine use)

Quality and Level of Evidence Analysis
Procainamide in VF/VT Cardiac Arrest

Author 'year (n)

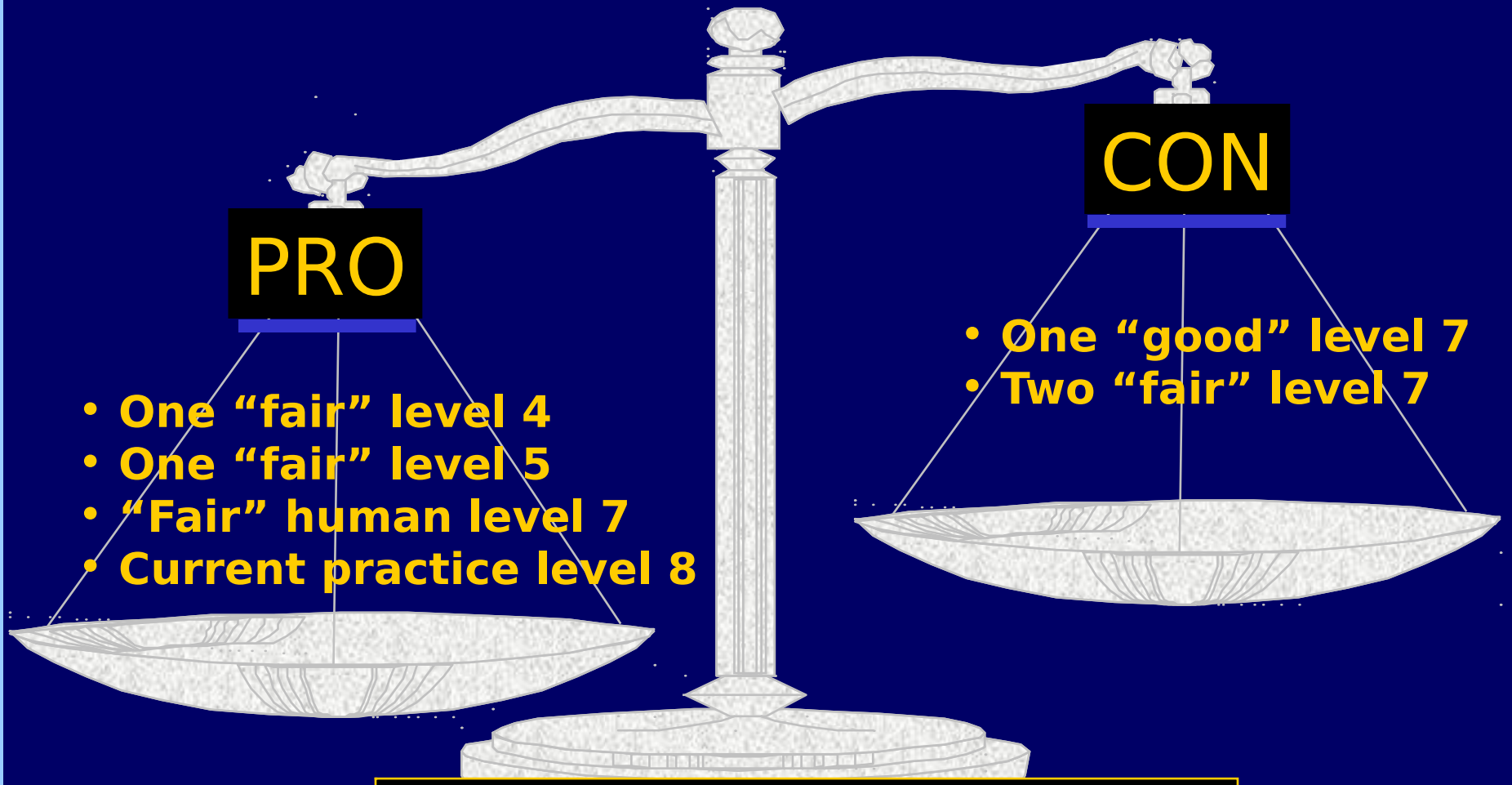
Supporting	1	2	3	4	5	6	7	8
Excellent								
Good								
Fair				7	1		2, 4 5, 8 10	

Neutral/Opposing	1	2	3	4	5	6	7	8
Fair							6, 9	
Good							3	
Excellent								

Level

1. Giardina '73 (20)
2. Greenspan '80
3. JawadKanber '74 (14)
4. Marchlinski '84
5. Oseran '85
6. Redding '63
7. Stiell '95 (20/529)
8. Wynn '85
9. Yoon '74 (23)
10. Other EP Lab Studies

Procainamide in VF/VT Cardiac Arrest



Net: Unclassified (for persistent VT/VF)
Class IIB (for *recurrent* VT/VF)

Quality and Level of Evidence Analysis

Lidocaine in VF/VT Cardiac Arrest

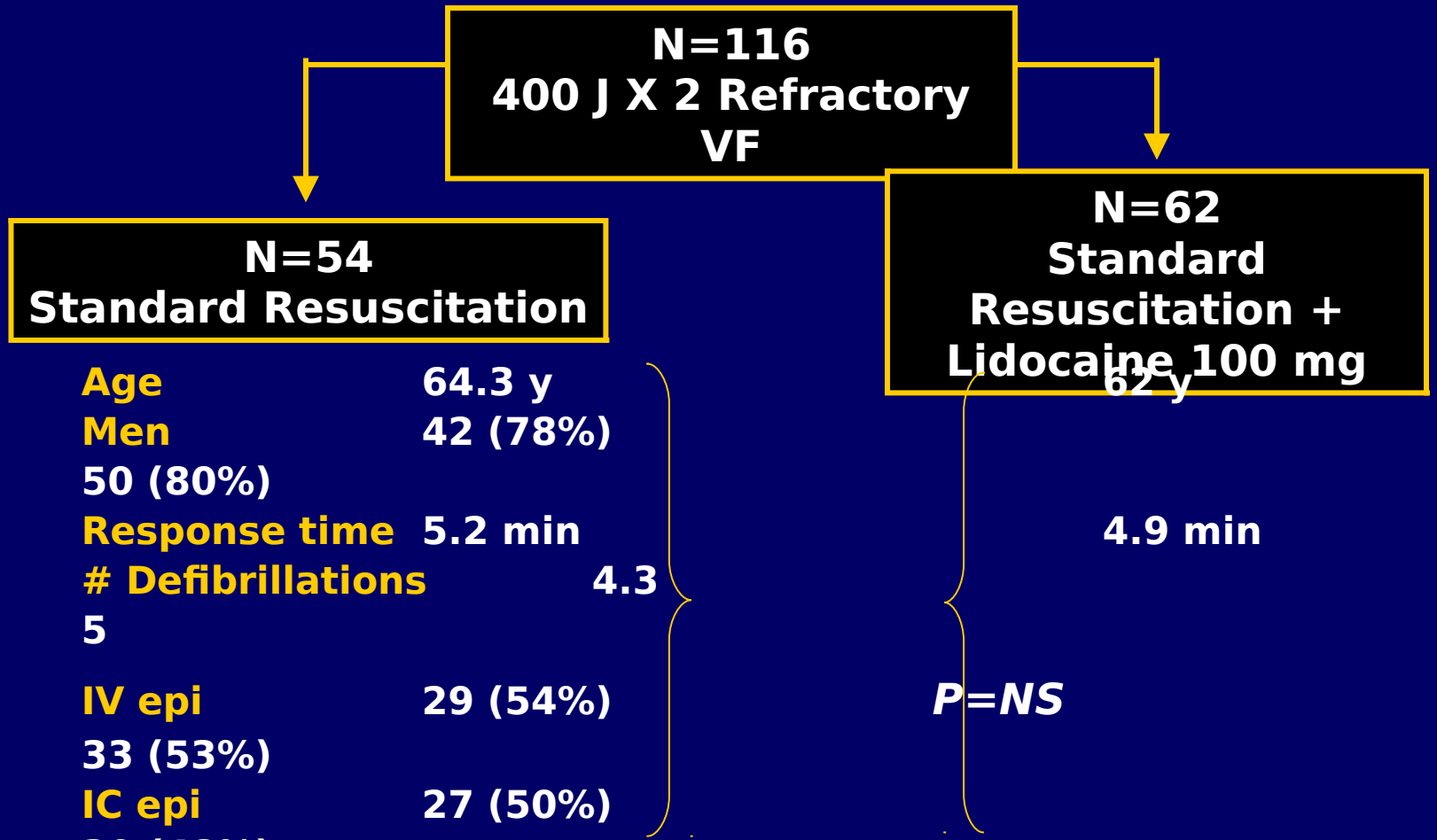
Author 'year (n)

Supporting / Neutral/Opposing	1	2	3	4	5	6	7	8
Excellent								
Good								
Fair				12		5	4, 9, 15, 16, 17 21, 25	Current Practice
Fair			10					
Good		13, 18		23, 24		2, 3, 6 7, 8, 14 19, 22	1, 20 26	
Excellent		11						

Level

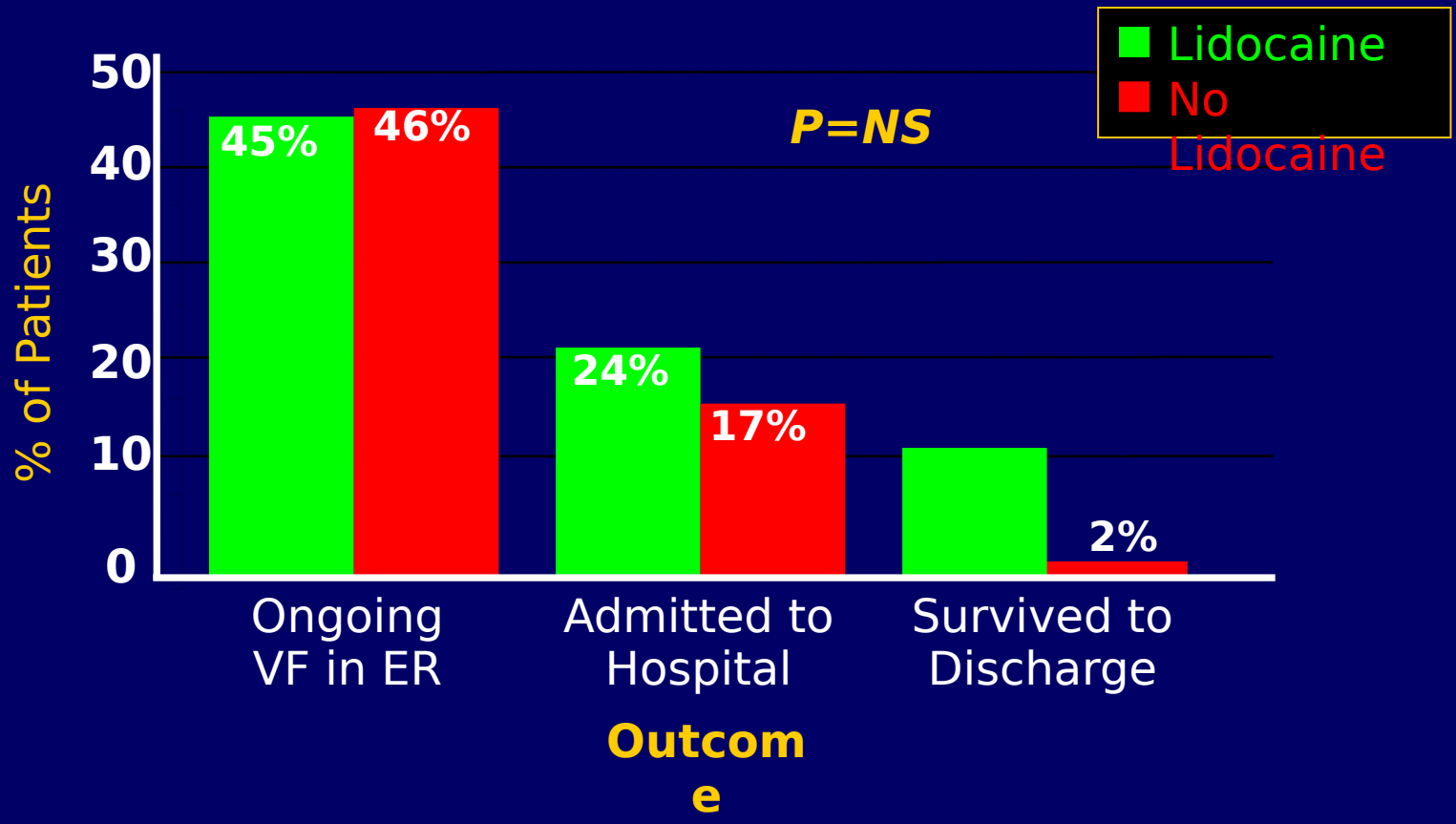
1. Alexander '99 (43704)
2. Anastasiou '94 (16)
3. Babbs '79
4. Borer '76
5. Carden '56 (23)
6. Chow '86
7. Dorian '86
8. Echt '89
9. Harrison '63 (12)
10. Harrison '81 (116)
11. Haynes '81 (146)
12. Herlitz '97 (1360)
13. Kentsch '88 (20)
14. Kerber '86
15. Lazzara '73
16. Lazzara '78
17. Lie '74
18. Olson '84 (108)
19. Redding '68 (105)
20. Sadowski '99 (903)
21. Spear '72
22. Vachiery '90 (18)
23. VanWalraven '98 (773)
24. Weaver '90 (199)
25. Other MI trials
26. MI Meta-analyses

Lidocaine in Shock-refractory Out-of-Hospital VF



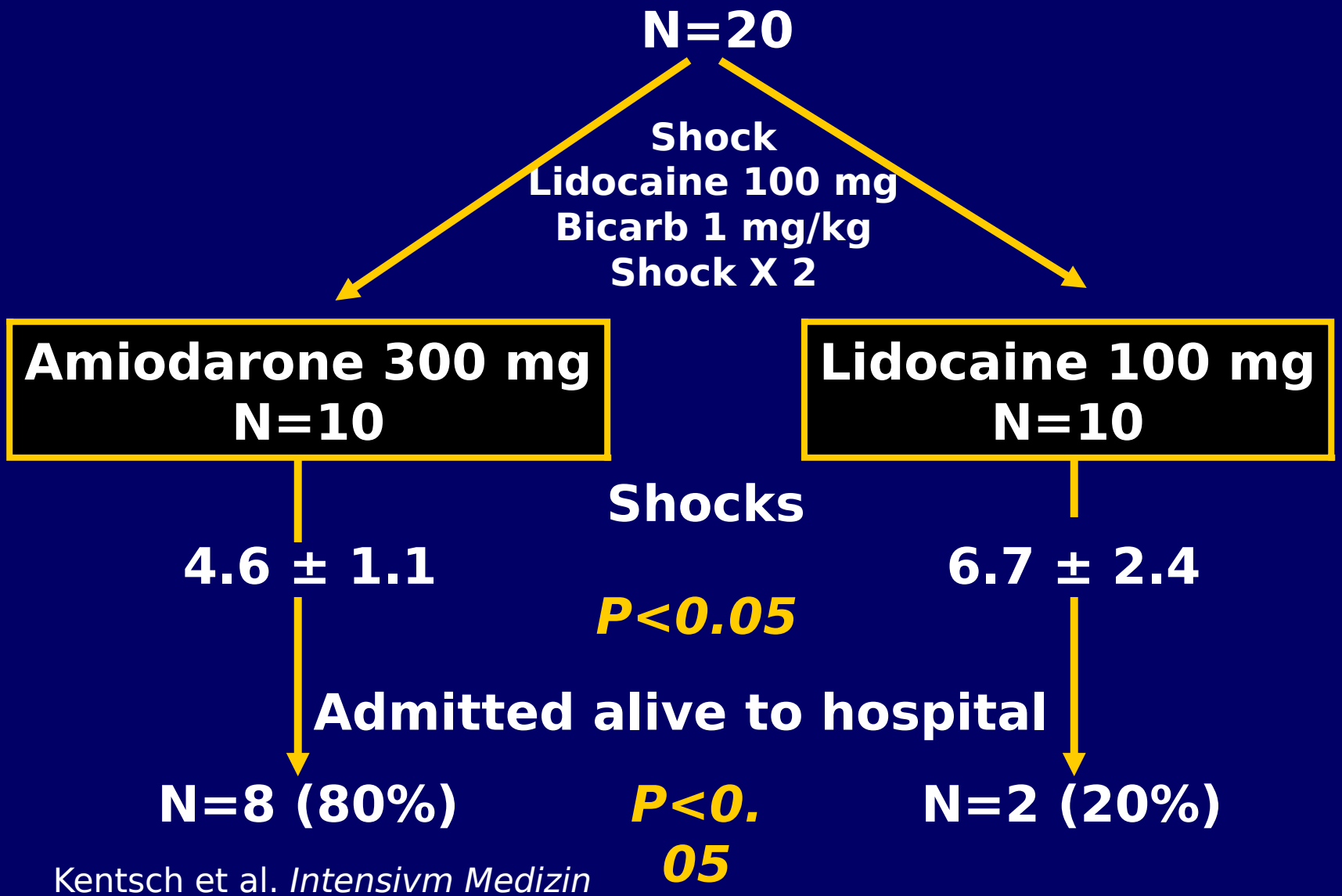
Harrison et al. *Ann Emerg Med* 1981;10:420.

Lidocaine in Shock-refractory Out-of-Hospital VF



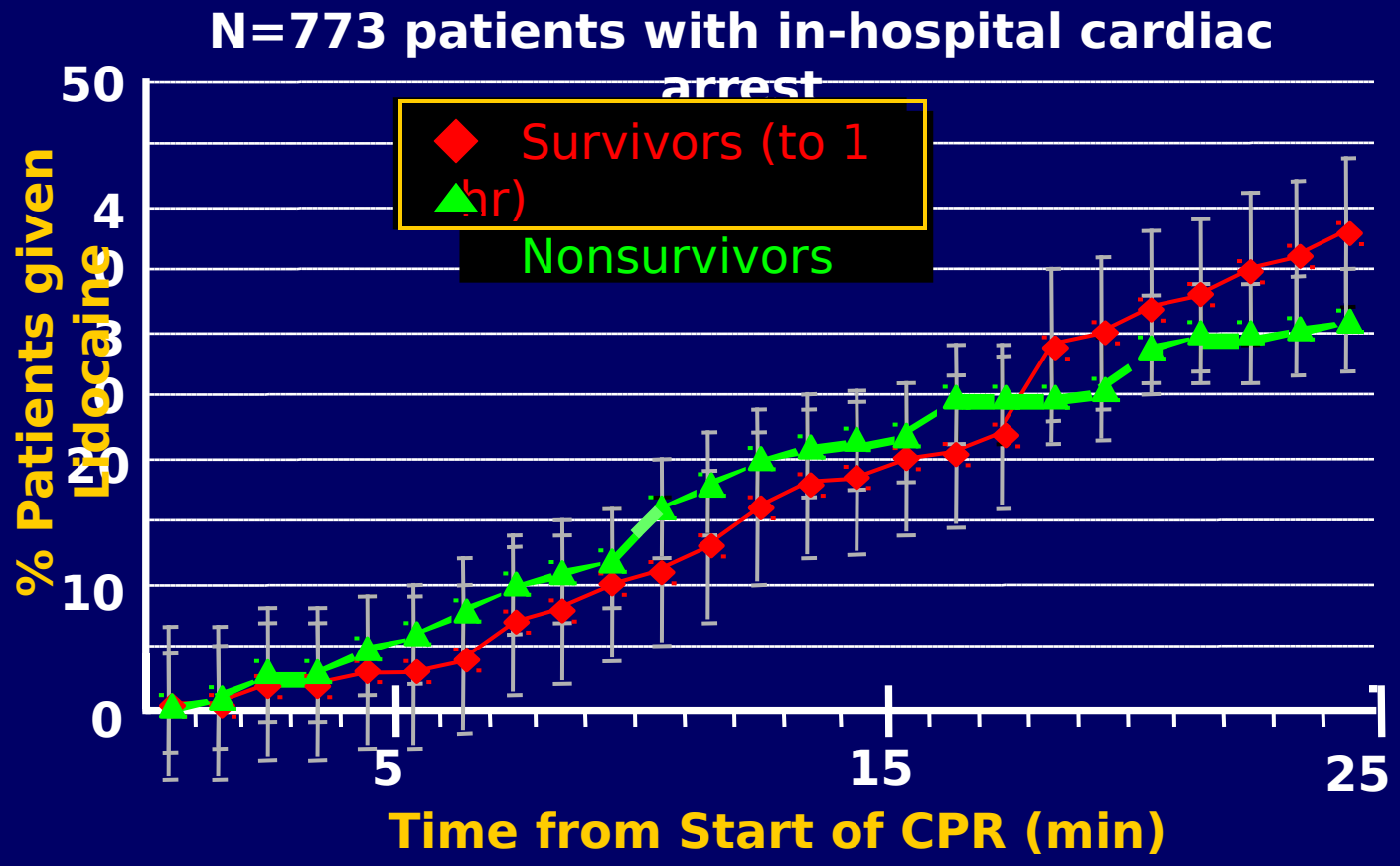
Harrison et al. *Ann Emerg Med* 1981;10:420.

Out-of-Hospital VF Cardiac Arrest



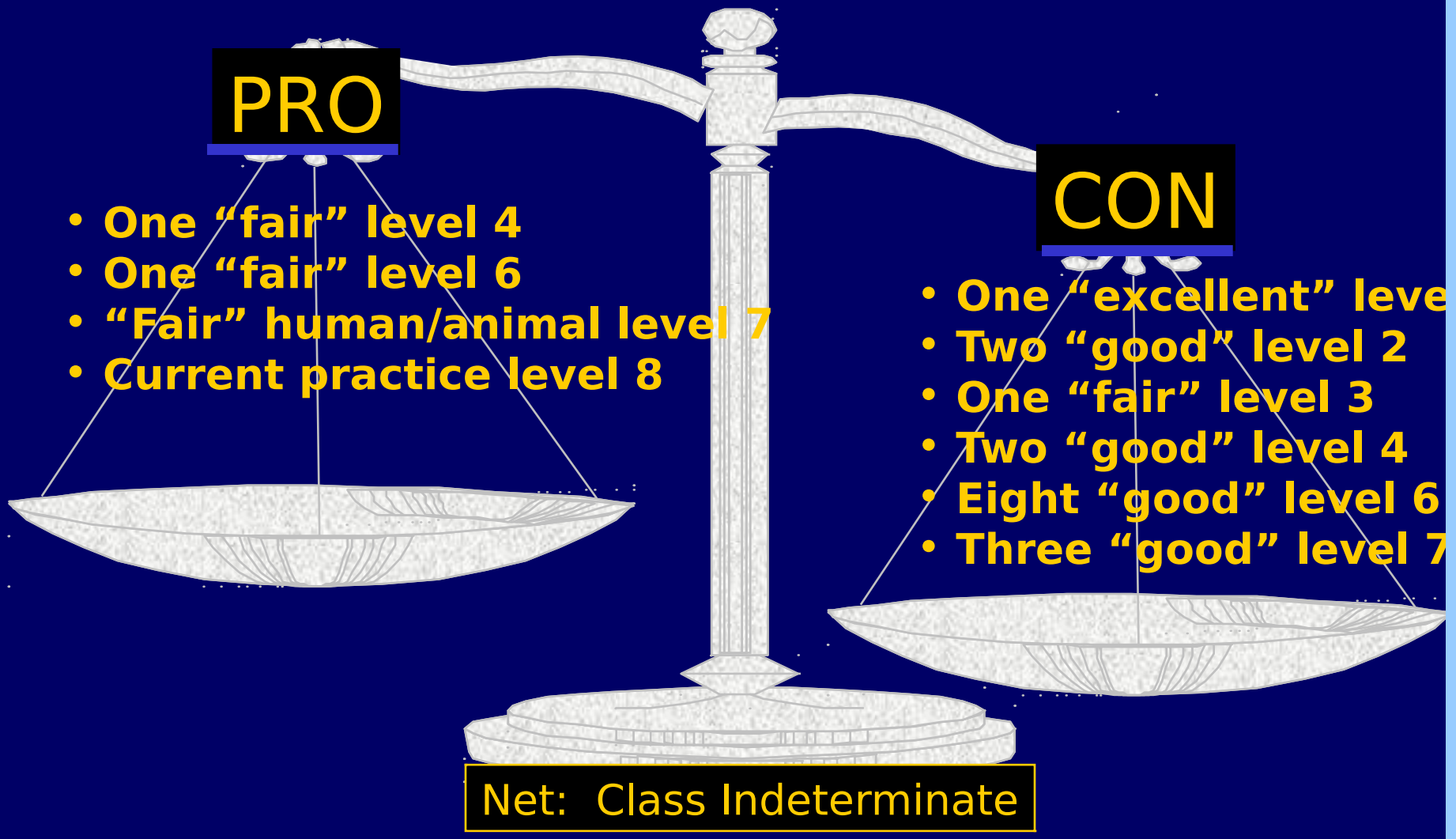
Kentsch et al. *Intensivm Medizin* 1988;25:70.

Effect of Lidocaine on Short-term Survival From Cardiac Arrest

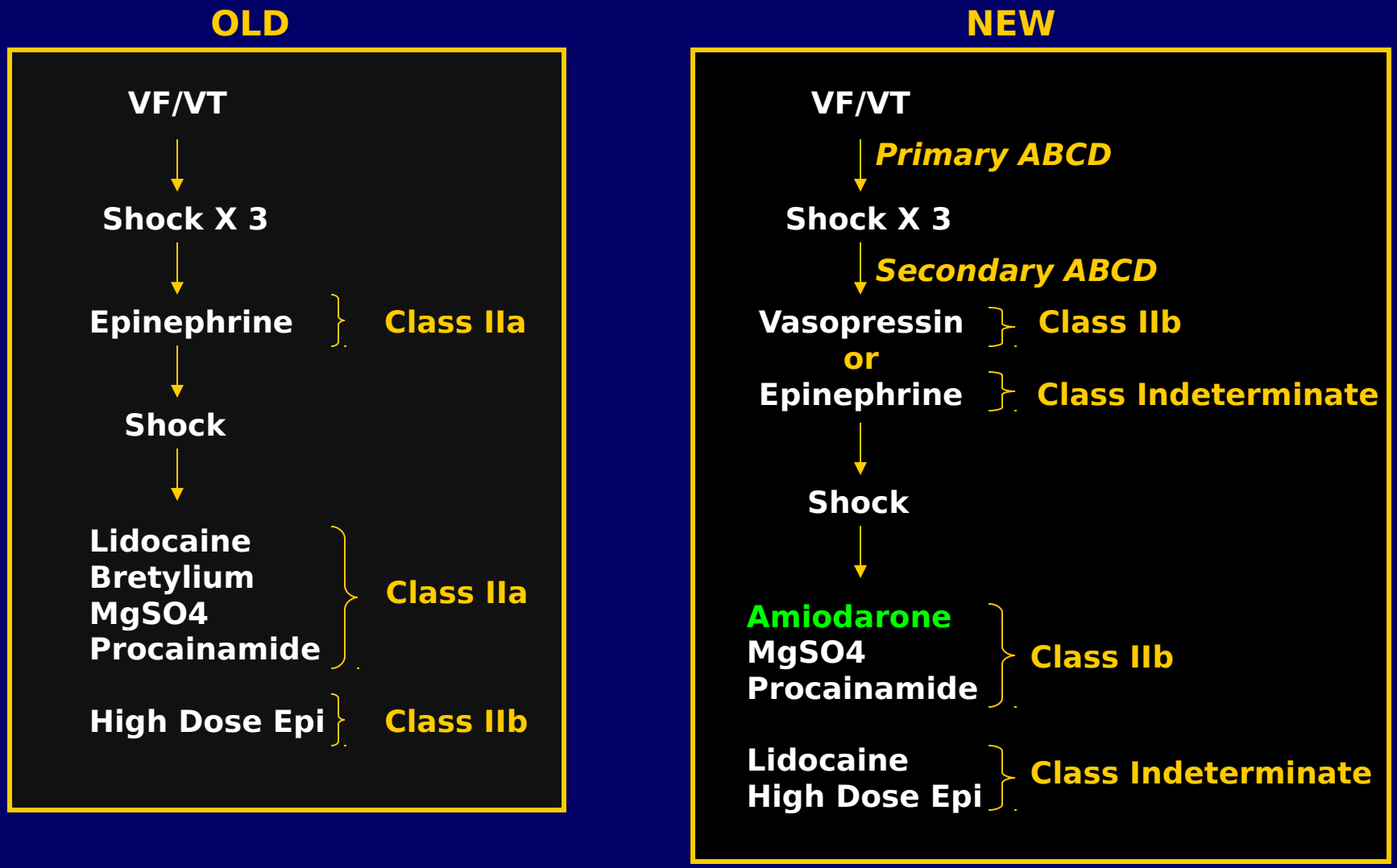


Cox proportional hazards model (95% CI): Controlled for patient (age, gender, medical hx)
and arrest (initial rhythm, cause of arrest, time-to-defibrillation) factors.
Van Walraven et al. *Ann Emerg Med* 1998;32:544

Lidocaine in VF/VT Cardiac Arrest

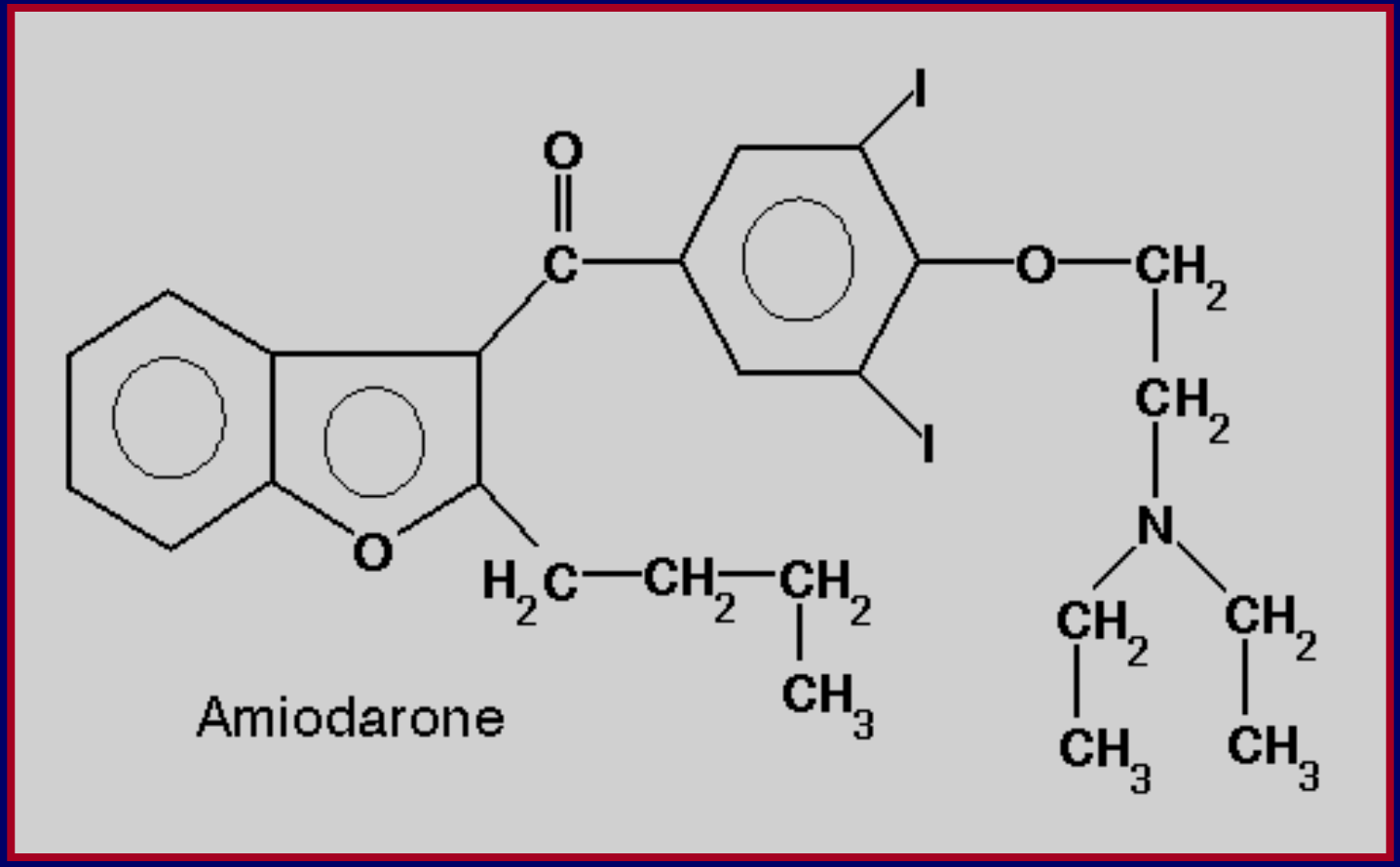

PRO
• One “fair” level 4
• One “fair” level 6
• “Fair” human/animal level 7
• Current practice level 8
CON
• One “excellent” level
• Two “good” level 2
• One “fair” level 3
• Two “good” level 4
• Eight “good” level 6
• Three “good” level 7
Net: Class Indeterminate

Ventricular Fibrillation



Amiodarone

STRUCTURE



HISTORY

Amiodarone

- 1962 - discovered in Belgium
- 1967 - 1st report of clinical antianginal properties
- 1974 - 1st report of antiarrhythmic properties in oral form
- 1986 - oral formulation approved for severe ventricular arrhythmias
- 1995 - approved in US for IV administration in unstable VT/VF

Quality and Level of Evidence Analysis:
Amiodarone in VF/VT Cardiac Arrest

Author 'year (n)

Supporting	1	2	3	4	5	6	7	8
Excellent	9	8						
Good						1, 3	15	
Fair		6			2, 4, 5, 7 11, 12, 13 14, 16, 18			

Neutral/Opposing	1	2	3	4	5	6	7	8
Fair								
Good		10 17					19	
Excellent								

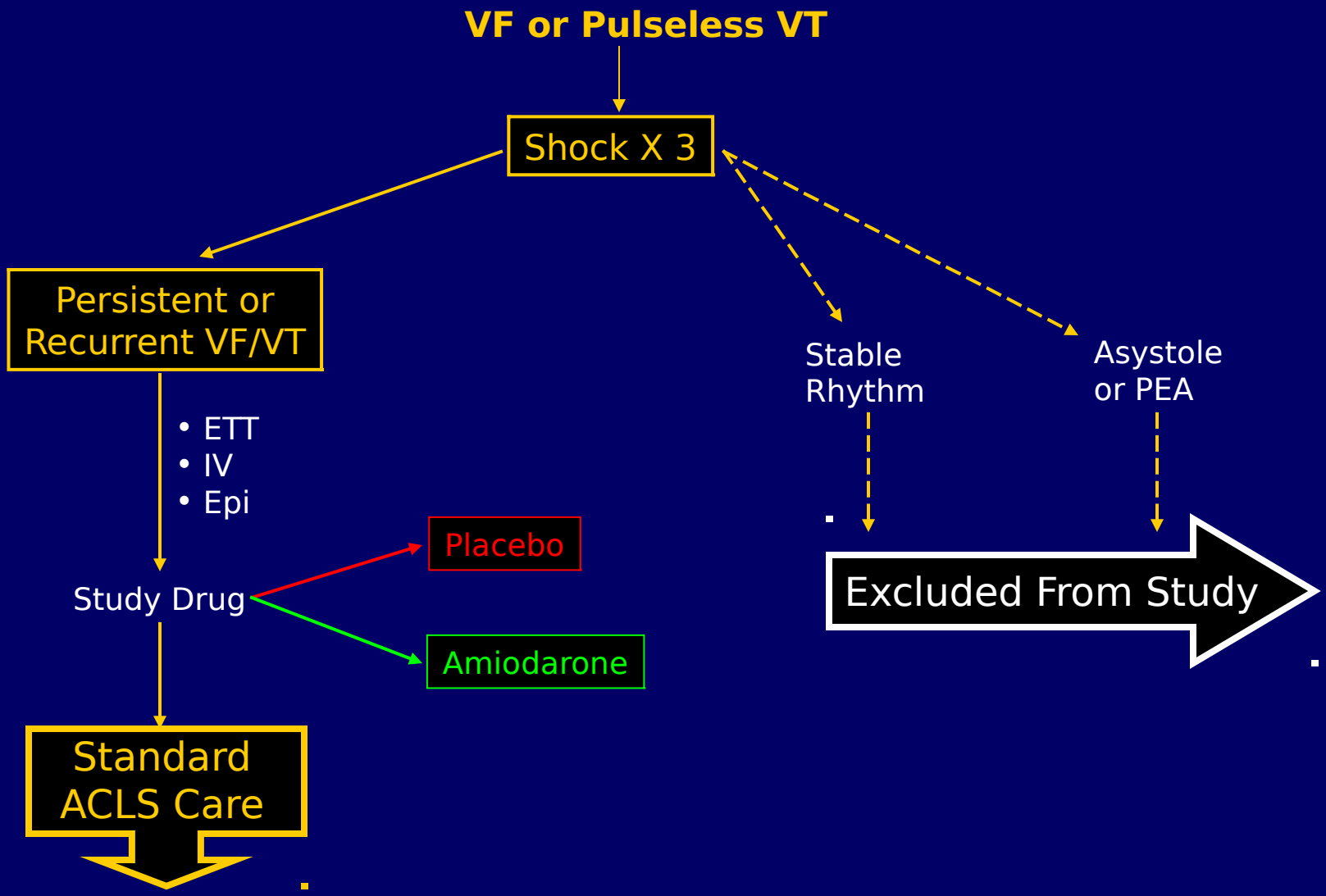
Level

1. AnastasiNana '94 (16)
2. Drexler (14)
3. Fain '87 (12)
4. Helmy '88 (46)
5. Horowitz (5)
6. Kentsch '88 (20)
7. Klein (13)
8. Kowey '95 (228)
9. Kudenchuk '99 (504)
10. Levine '96 (273)
11. Mooss (35)
12. Morady (15)
13. Nalos '91 (22)
14. Ochi (22)
15. Rosalion '91 (23)
16. Saksena (9)
17. Scheinman '95 (342)
18. Schutzenberger

ARREST Trial: Design

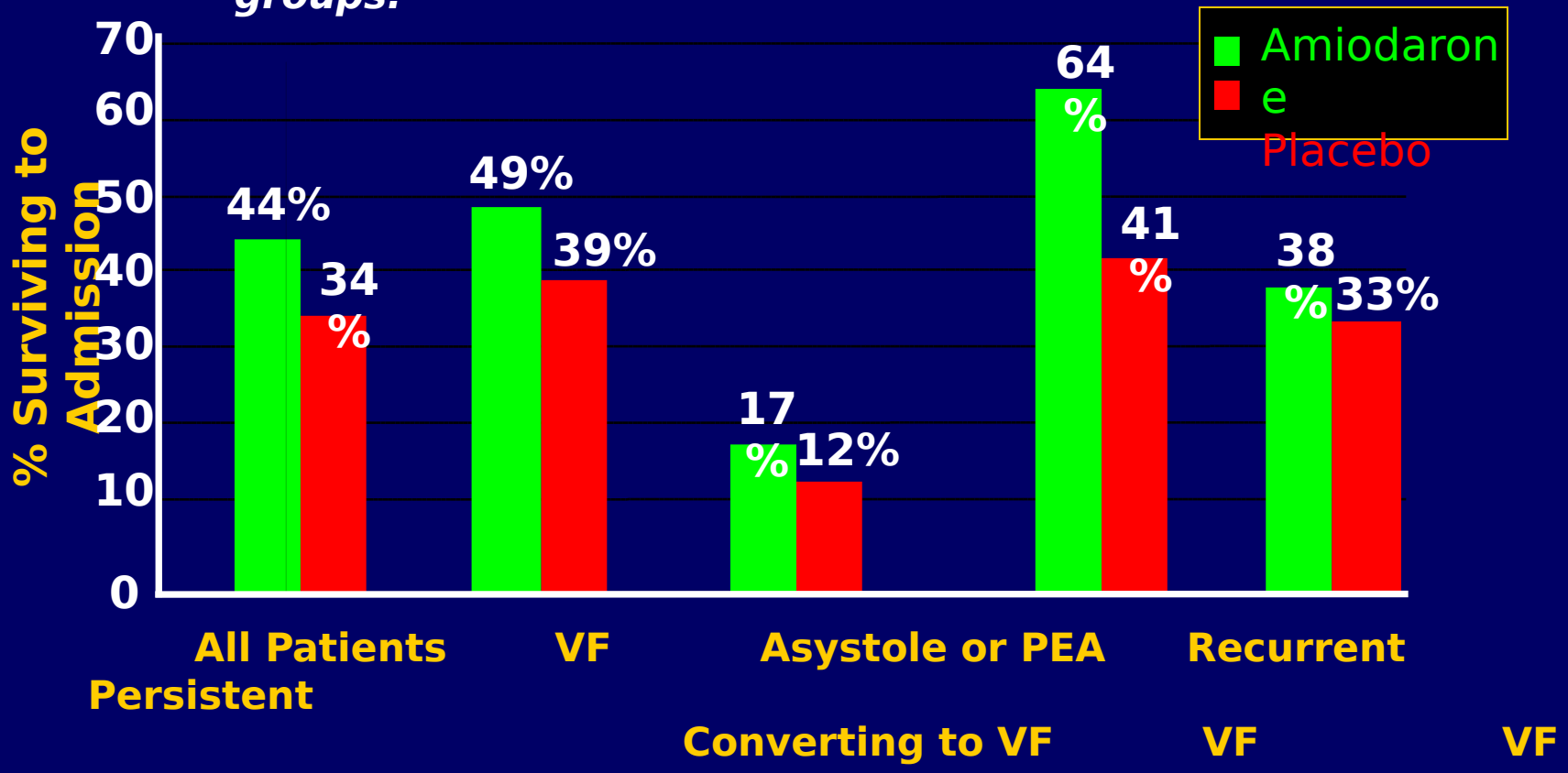
- Objective
  - Comparison of 1992 ACLS Guidelines with and without IV amiodarone in shock-refractory VT/VF cardiac arrest
- Methods
  - Double-blind RCT (n=504)
  - Randomization to 300 mg amiodarone or placebo
- Amiodarone dosing
  - Rapid bolus of 300 mg vial diluted with D_5W to a volume of 20 mL in sterile syringe

ARREST Trial Algorithm



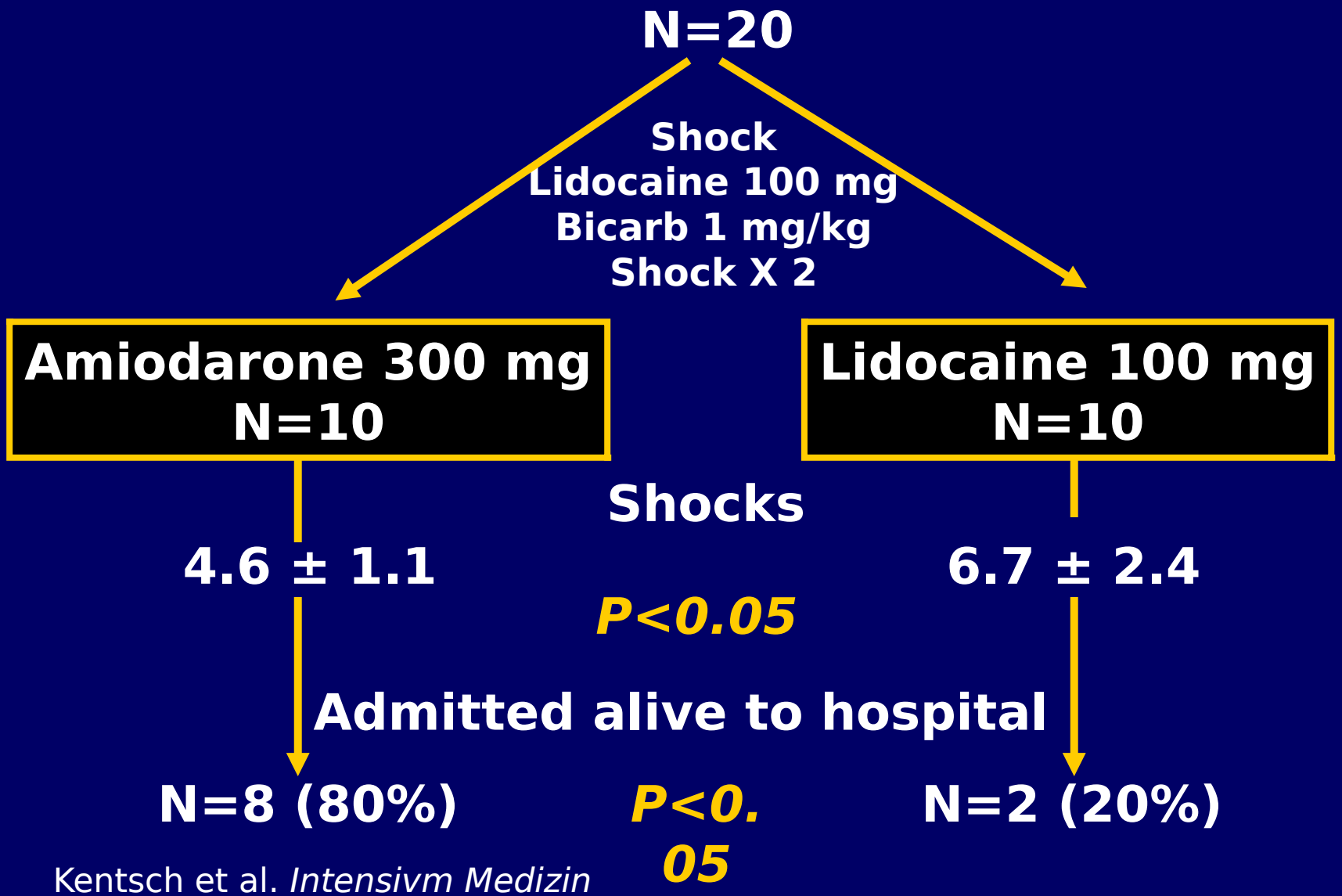
Amiodarone for Cardiac Arrest: Benefit by Subgroups

Statistically significant improvement across all groups.



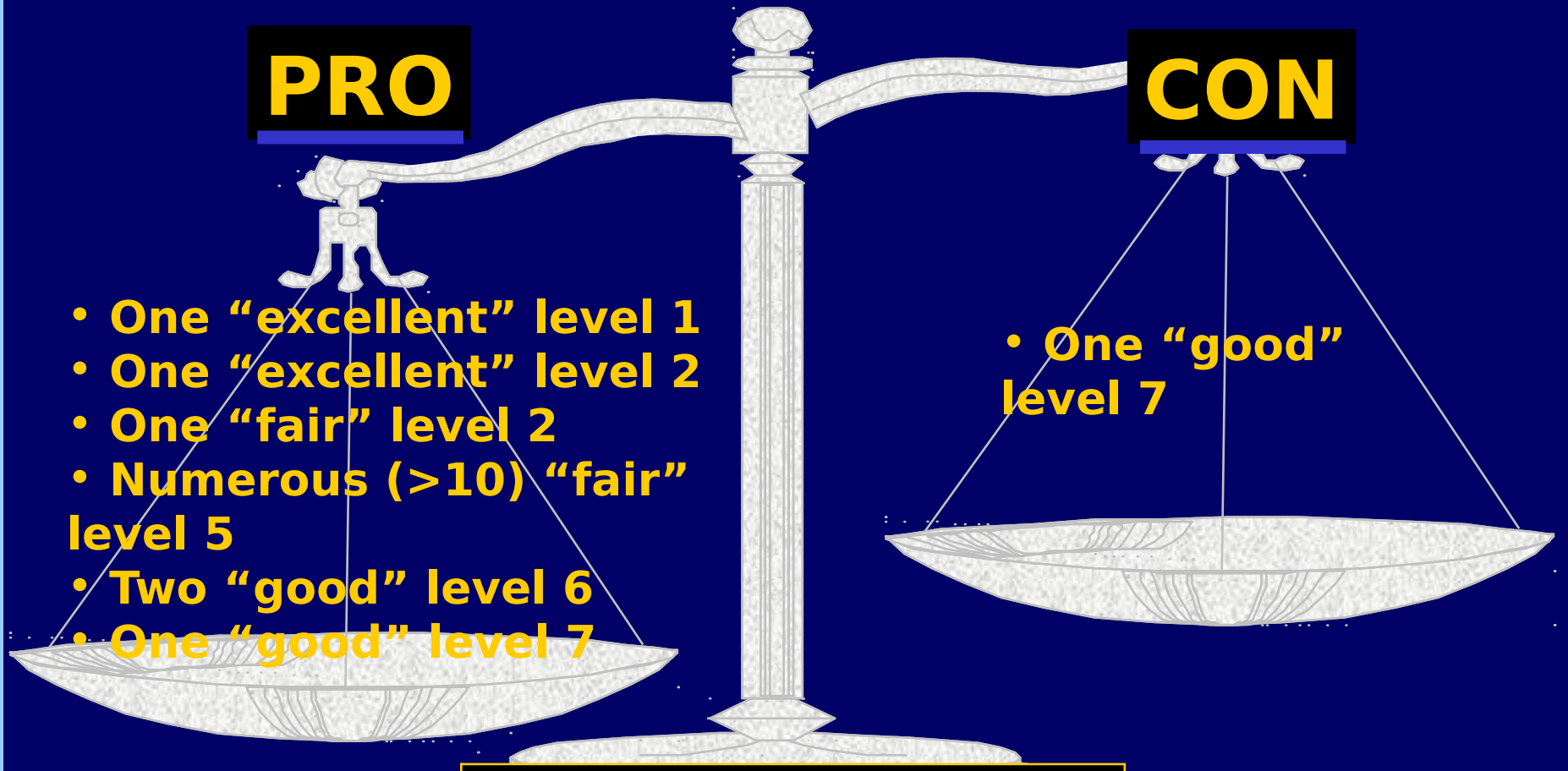
Kudenchuk, et al. The ARREST Trial. *NEJM*, 1999.

Out-of-Hospital VF Cardiac Arrest



Kentsch et al. *Intensivm Medizin* 1988;25:70.

Amiodarone in VF/VT Caridac Arrest


PRO
CON
• One “excellent” level 1
• One “excellent” level 2
• One “fair” level 2
• Numerous (>10) “fair” level 5
• Two “good” level 6
• One “good” level 7
• One “good” level 7

Net: Class IIB for persistent or recurrent VF/VT

Amiodarone IV

Side Effect	Incidence
Hypotension	16.0 %
Bradycardia	4.9 %
Nausea	3.9 %
LFT abnormalities	3.4 %
Cardiac arrest	2.9 %
VT	2.4 %
CHF	2.1 %
Fever	2.0 %

Hypotension

- Mechanism:
  - vasodilation
  - heart block
  - negative inotropicity

- Rarely a cause for discontinuing the drug

- Treatment:
  - slow the rate of infusion
  - intravenous fluids
  - vasopressor

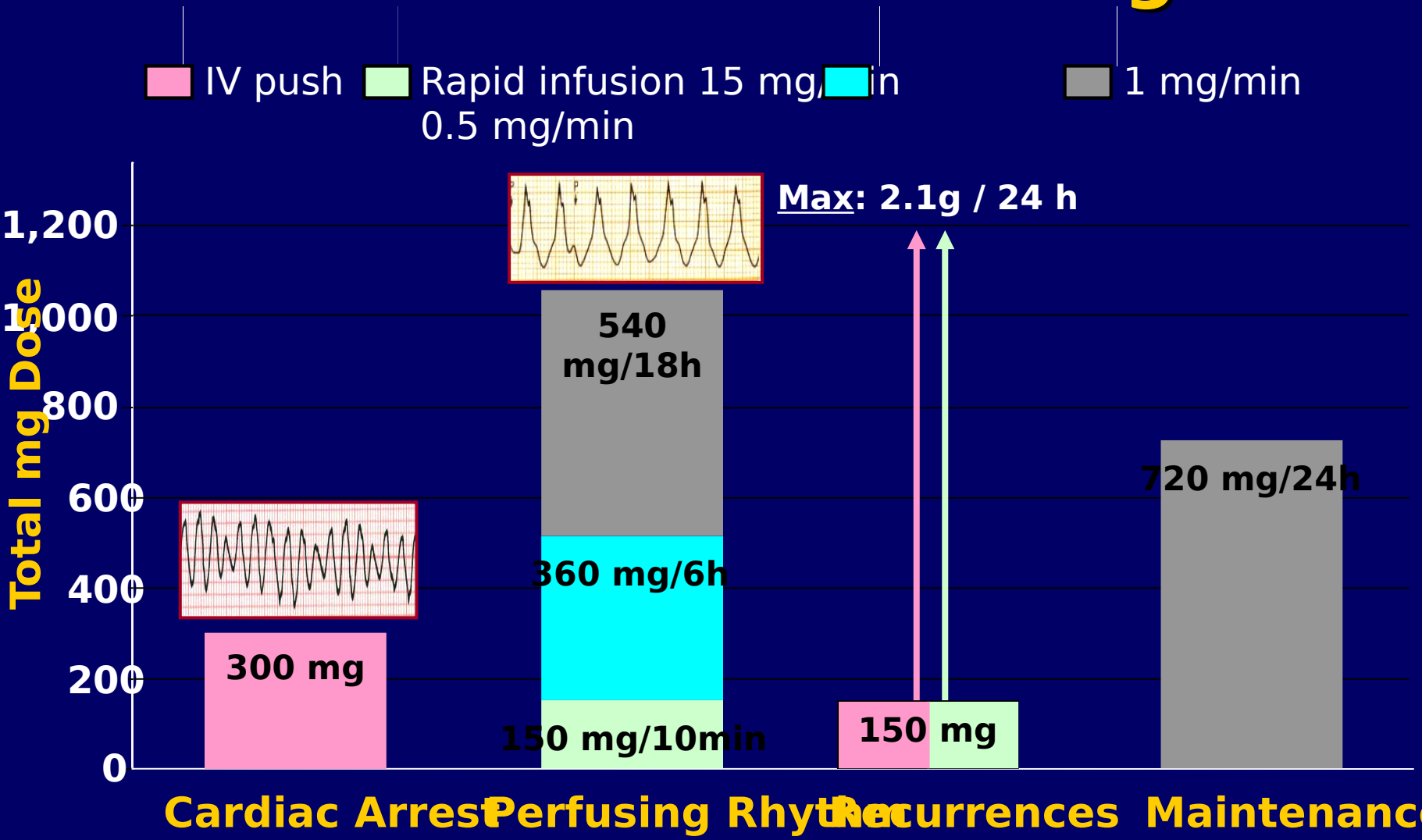
DOSING

Amiodarone

- Begin with a 150 mg IV bolus over 10 min for a perfusing rhythm, and 300 mg IV bolus for cardiac arrest

- Followed by 1mg/min for 6 hrs
- Followed by 0.5 mg/min
- Breakthrough events --> 150 mg IV boluses
- Max dose: 2.1 g/24 hr

IV Amiodarone Dosing*

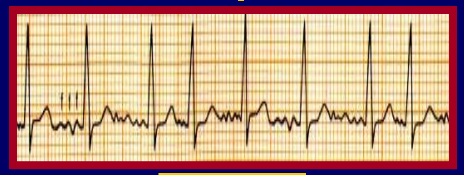


* Amiodarone I.V. should, whenever possible, be administered through a CVL, and an in-line filter should be used during administration.

Tachycardia

Unstable → Cardioversion

Stable



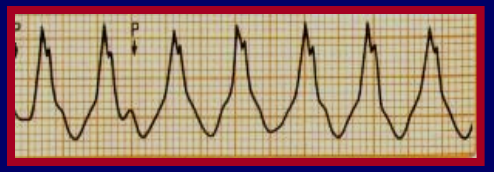
A Fib

A Flutter

SVT

- Junctional Tach
- Atrial Tach
- PSVT

Wide-complex Tachycardia of Uncertain Etiology



VT

- Monomorphic
- Polymorphic

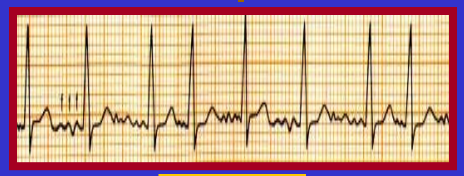
Estimating Cardiac Function

- Rodriguez, et al. *J Emerg Med* 2000
  - Human, Descriptive Study (n=34)
  - Physician estimates based on history, physical, EKG, lab tests, and X-rays
  - No correlation was noted between EP estimates of CO and objective data obtained by esophageal doppler probe
  - Complete disagreement with regard to low or high CO was noted for 21% of the paired measurements

Tachycardia

Unstable → Cardioversion

Stable



A Fib

A Flutter

SVT

- Junctional Tach
- Atrial Tach
- PSVT

VT

- Monomorphic
- Polymorphic

Wide-complex Tachycardia of Uncertain Etiology

Atrial Fibrillation / Atrial Flutter

OLD

A Fib/Flutter

↓

Diltiazem
β-Blockers
Verapamil
Digoxin
Procainamide
Quinidine
Anticoagulants

Atrial Fibrillation / Atrial Flutter

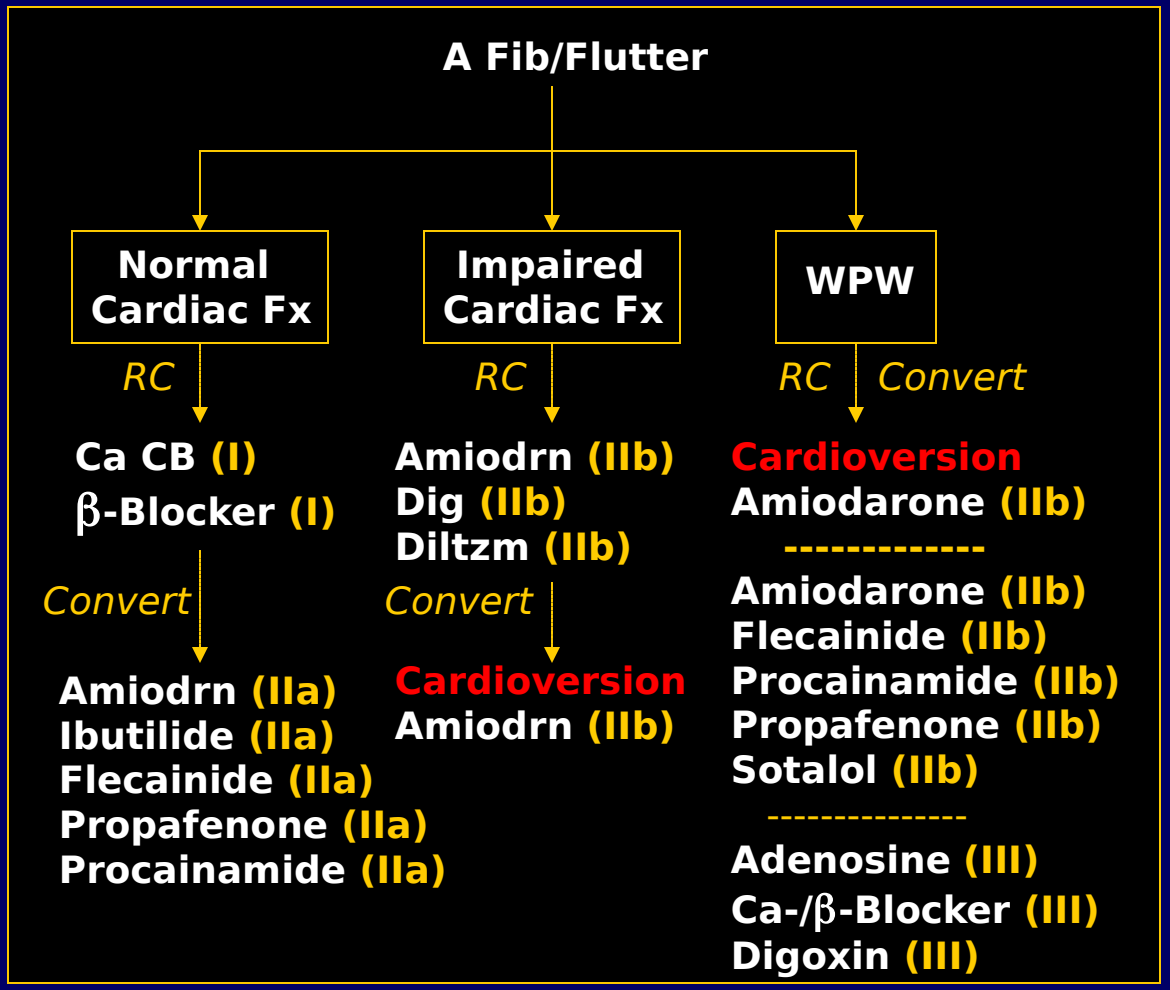
OLD

A Fib/Flutter

↓

Diltiazem
β-Blockers
Verapamil
Digoxin
Procainamide
Quinidine
Anticoagulants

NEW



4 Clinical Features

- Patient clinically unstable?
- Cardiac function impaired?
- WPW present?
- Duration < 48 or > 48 hours?

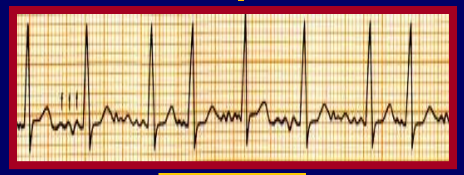
Clinical Evaluation

- Treat unstable patients urgently
- Control the rate
- Convert the rhythm
- Provide anticoagulation

Tachycardia

Unstable → Cardioversion

Stable



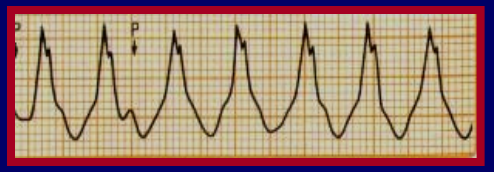
A Fib

A Flutter

SVT

- Junctional Tach
- Atrial Tach
- PSVT

Wide-complex Tachycardia of Uncertain Etiology



VT

- Monomorphic
- Polymorphic

Tachycardia

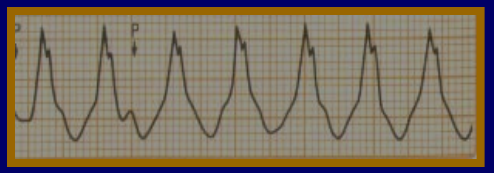
Unstable

Cardioversion

Stable

A Fib

SVT



VT

Junctional Tach

Atrial Tach

PSVT

Monomorphic

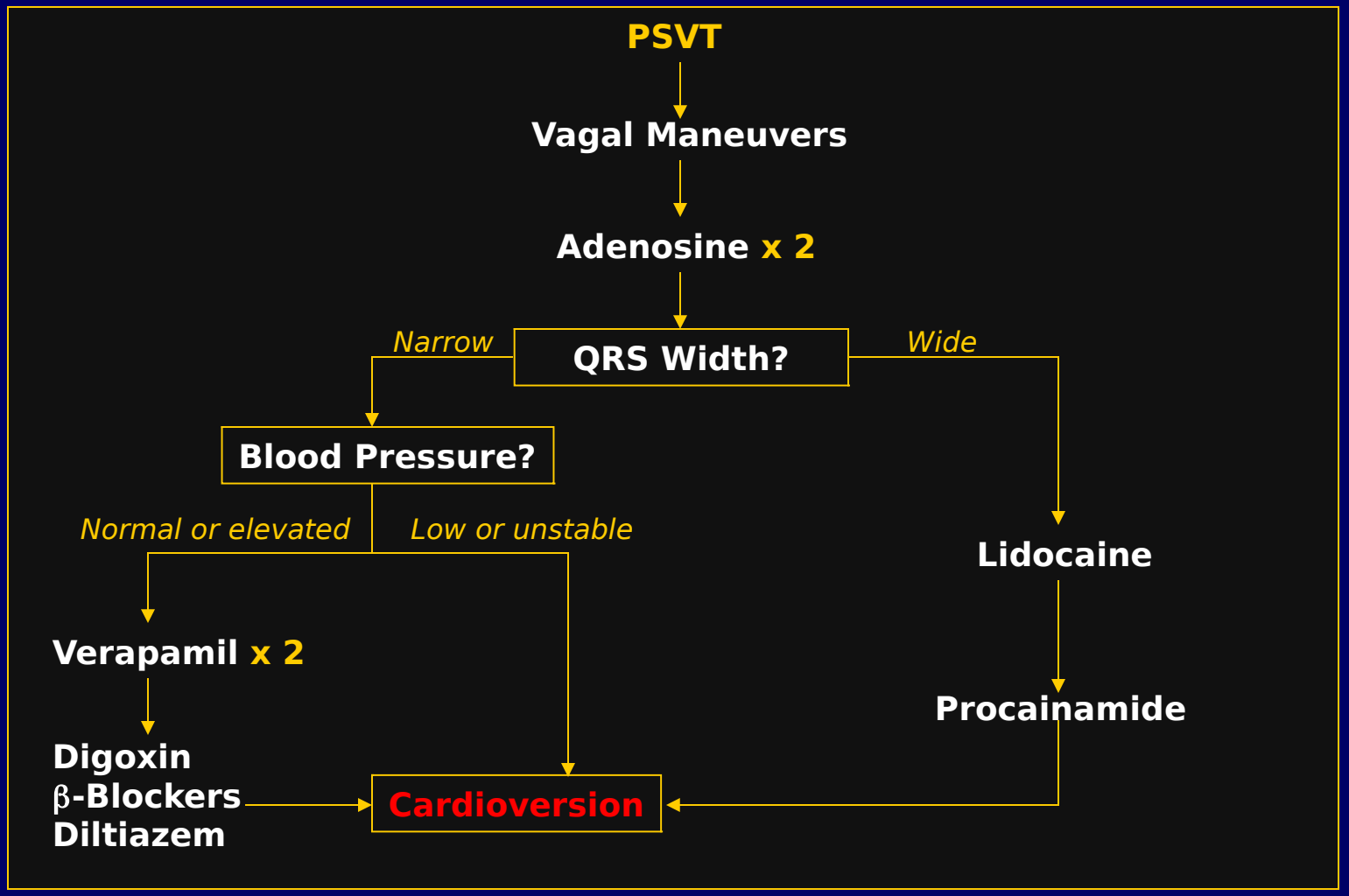
Polymorphic

A Flutter

Wide-complex Tachycardia of Uncertain Etiology

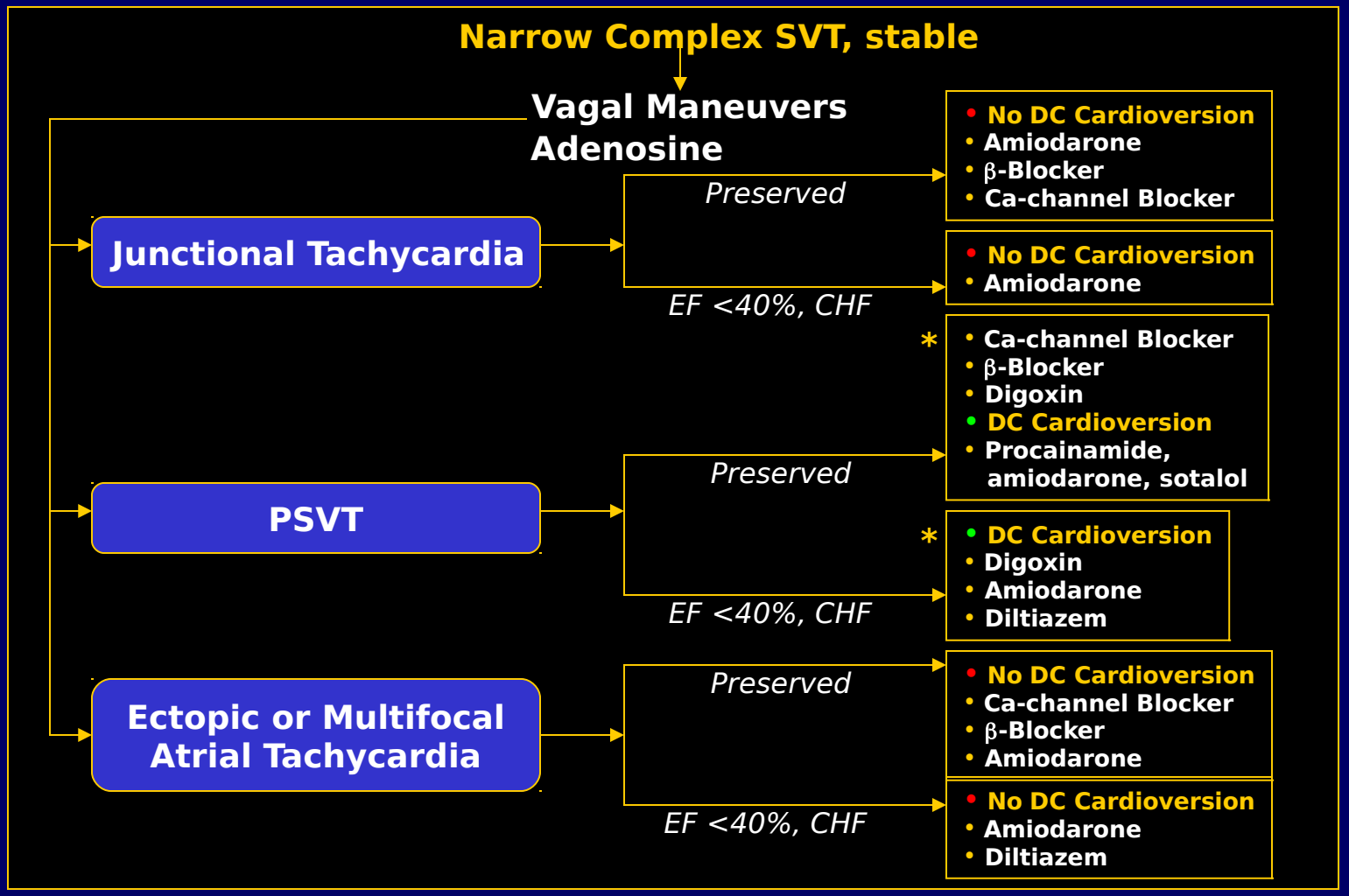
PSVT

OLD


PSVT
Vagal Maneuvers
Adenosine x 2
QRS Width?
Narrow
Wide
Blood Pressure?
Normal or elevated
Low or unstable
Verapamil x 2
Digoxin
β-Blockers
Diltiazem
Cardioversion
Lidocaine
Procainamide

SVT

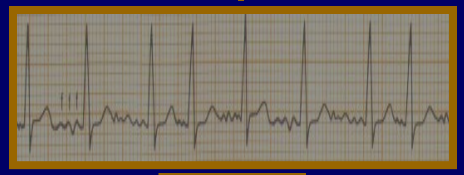
NEW


Narrow Complex SVT, stable
Vagal Maneuvers
Adenosine
Junctional Tachycardia
Preserved
• No DC Cardioversion
• Amiodarone
• β-Blocker
• Ca-channel Blocker
EF <40%, CHF
• No DC Cardioversion
• Amiodarone
*
• Ca-channel Blocker
• β-Blocker
• Digoxin
• DC Cardioversion
• Procainamide, amiodarone, sotalol
PSVT
Preserved
*
• DC Cardioversion
• Digoxin
• Amiodarone
• Diltiazem
EF <40%, CHF
Ectopic or Multifocal Atrial Tachycardia
Preserved
• No DC Cardioversion
• Ca-channel Blocker
• β-Blocker
• Amiodarone
EF <40%, CHF
• No DC Cardioversion
• Amiodarone
• Diltiazem

Tachycardia

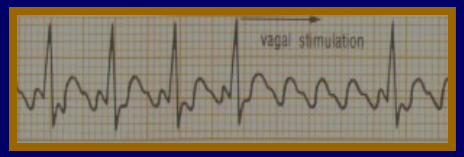
Unstable → Cardioversion

Stable



A Fib

A Flutter



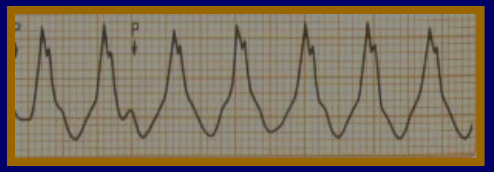
SVT

Junctional Tach

Atrial Tach

PSVT

Wide-complex Tachycardia of Uncertain Etiology



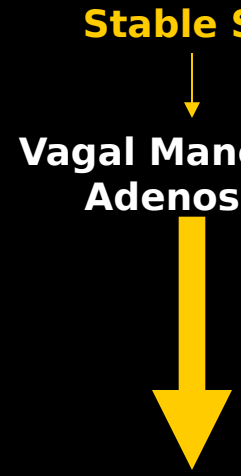
VT

Monomorphic

Polymorphic

Simplified SVT Algorithm

Simplified SVT Algorithm

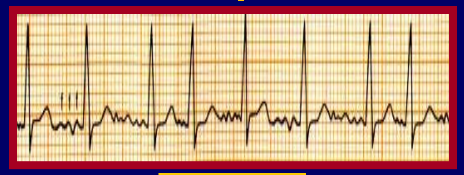


*If you are sure the patient has PSVT and preserved cardiac function, then you should use a Ca-channel blocker, a β-blocker, or digoxin, and, if unsuccessful, **Cardioversion**.

Tachycardia

Unstable → Cardioversion

Stable



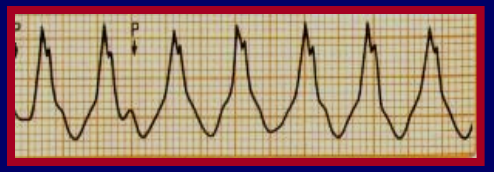
A Fib

A Flutter

SVT

- Junctional Tach
- Atrial Tach
- PSVT

Wide-complex Tachycardia of Uncertain Etiology



VT

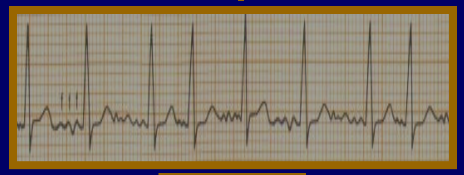
- Monomorphic
- Polymorphic

Tachycardia

Unstable

Cardioversion

Stable



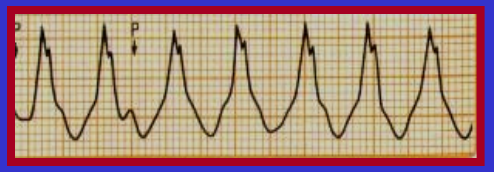
A Fib

SVT

Junctional Tach

Atrial Tach

PSVT

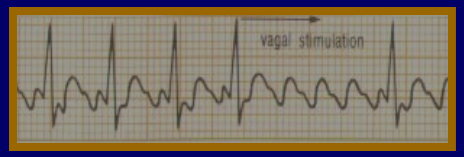


VT

Monomorphic

Polymorphic

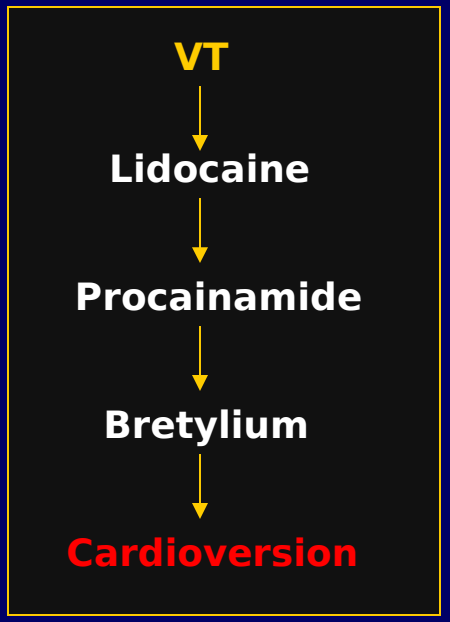
A Flutter



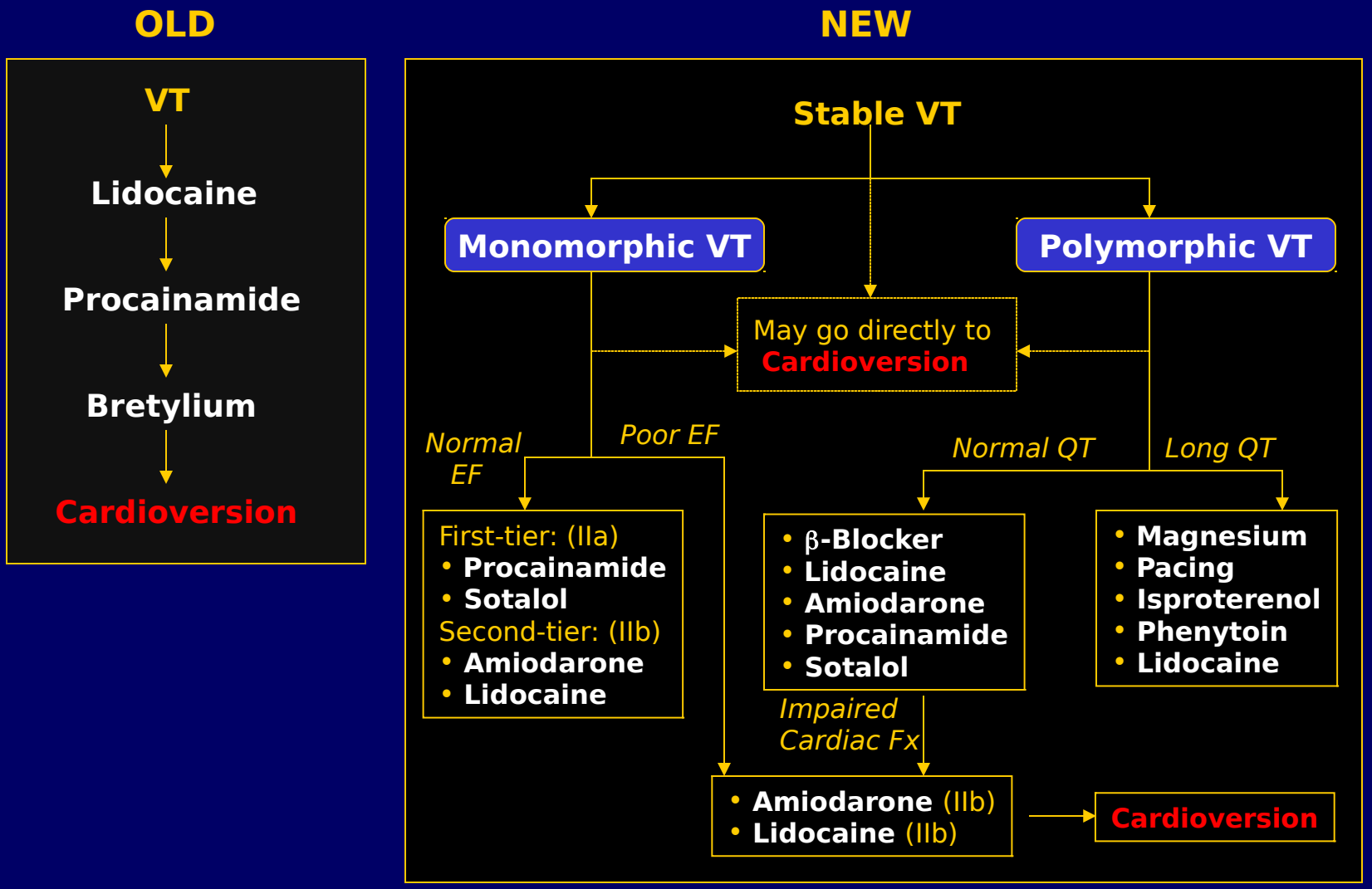
Wide-complex Tachycardia of Uncertain Etiology

Ventricular Tachycardia

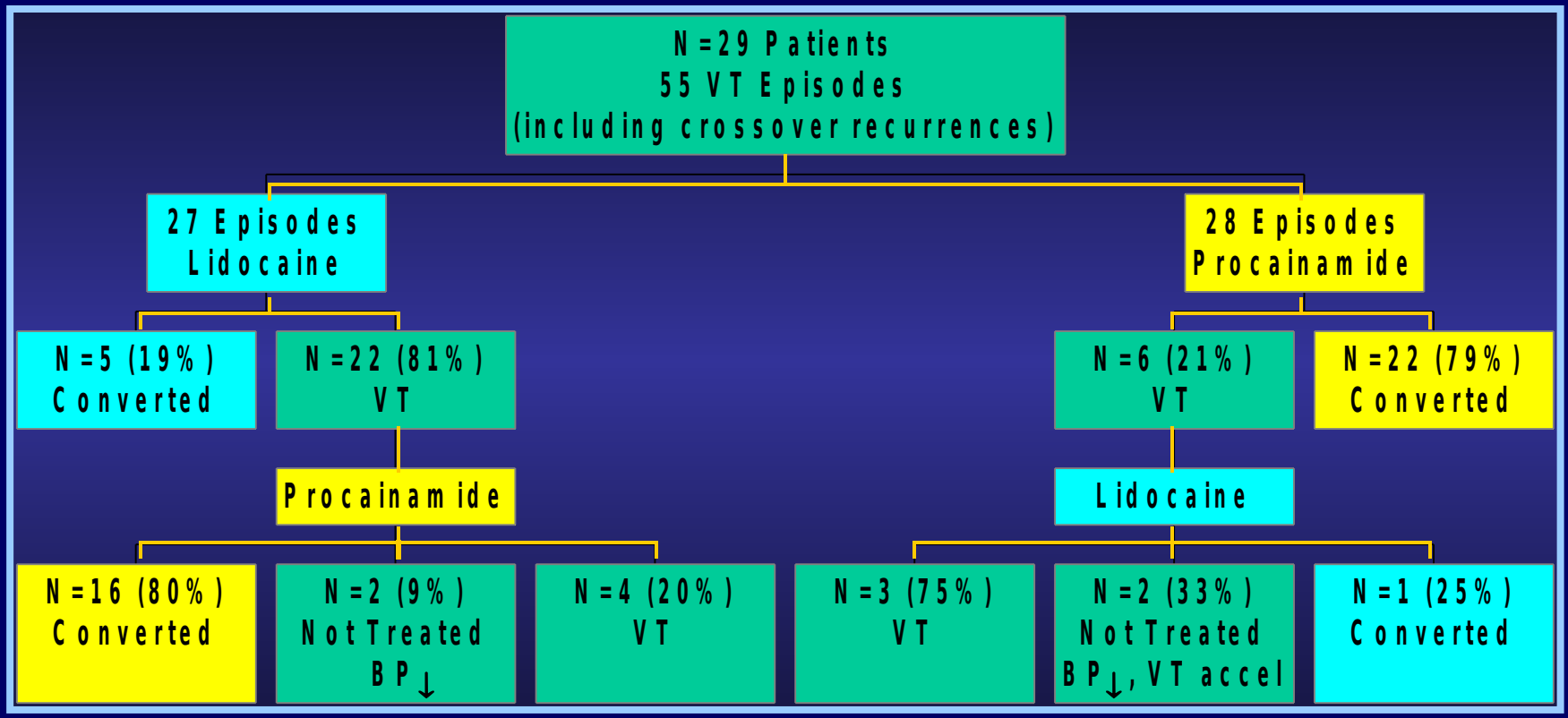
OLD



Ventricular Tachycardia



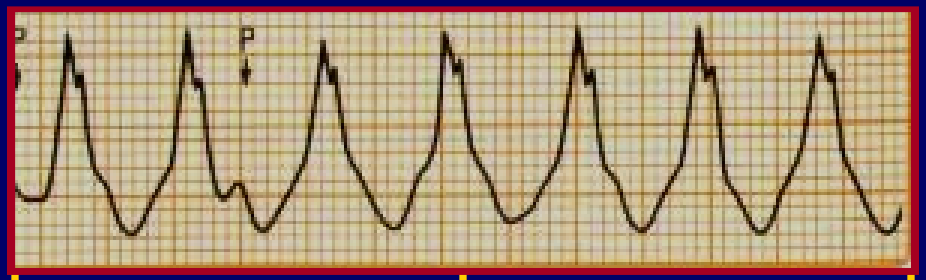
Procainamide vs Lidocaine in Stable VT



Net conversion: **Procainamide (79%)**
Lidocaine (19%)

Gorgels et al. *Am J Cardiol* 1996;78:43.

Stable Monomorphic VT



Preserved Cardiac Function

NOTE!
May go directly to Cardioversion

Impaired LV EF<40% or CHF

Medications: any one
- Procainamide (IIa)
- Sotalol (IIa)
- Amiodarone (IIb)
- Lidocaine (IIb)

- Amiodarone (IIb)
  -150 mg IV infused over 10 min, repeat as needed (max 2 gm/24˚)
- Lidocaine (IIb)
  -0.5 to 0.75 mg/kg IV push

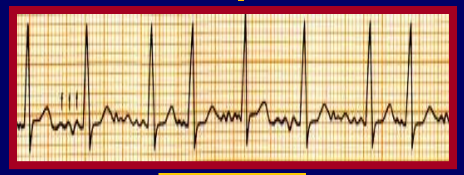
Then use
- Synchronized cardioversion

Circulation 2000;102 (suppl I):I-158–I-165).00

Tachycardia

Unstable → Cardioversion

Stable



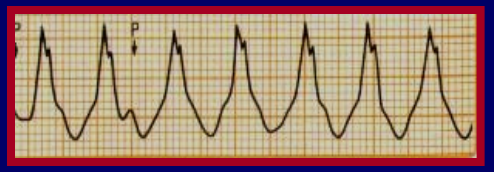
A Fib

A Flutter

SVT

- Junctional Tach
- Atrial Tach
- PSVT

Wide-complex Tachycardia of Uncertain Etiology



VT

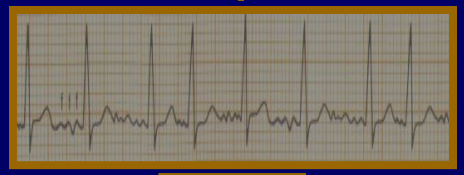
- Monomorphic
- Polymorphic

Tachycardia

Unstable

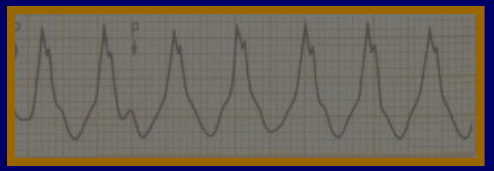
Cardioversion

Stable



A Fib

SVT



VT

Junctional Tach

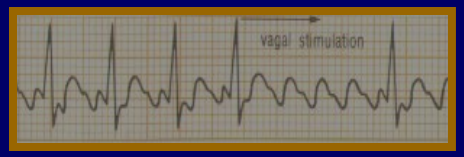
Atrial Tach

PSVT

Monomorphic

Polymorphic

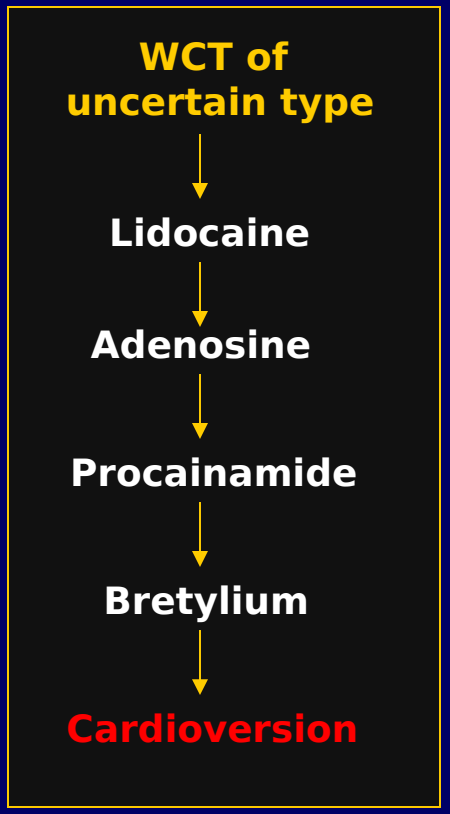
A Flutter



Wide-complex Tachycardia of Uncertain Etiology

WCT of Unknown Type

OLD



WCT of Unknown Type

OLD

WCT of uncertain type

↓

Lidocaine

↓

Adenosine

↓

Procainamide

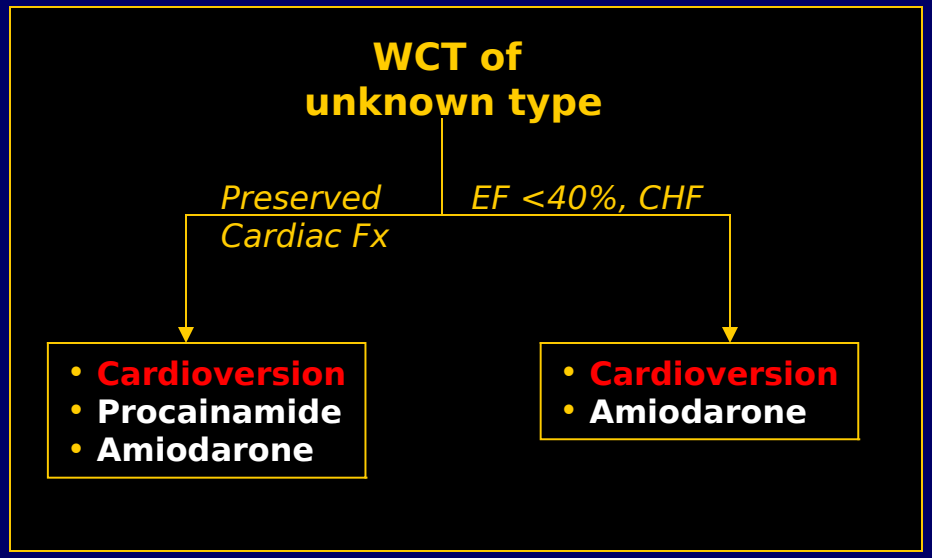
↓

Bretylium

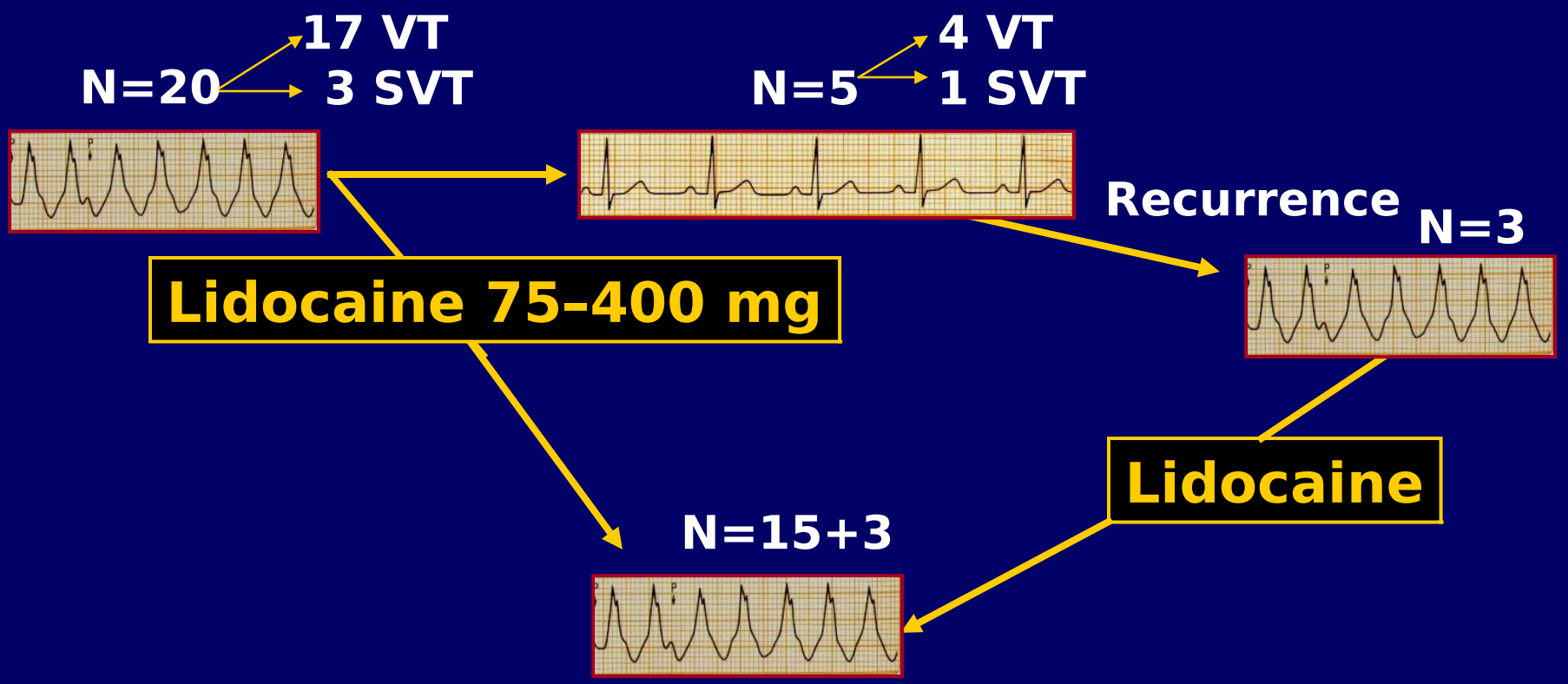
↓

Cardioversion

NEW



Wide-complex Tachycardia: Ineffectiveness of Lidocaine



Net Efficacy = 2/20 (10%)

Armengol et al. *Ann Emerg Med* 1989;18:254.

Tachyarrhythmic Agents

Drug/Recommeded Use (Class)	Amiodarone	β-Blocker	Ca-Blocker	Lidocaine	Magnesium	Procainamide
VF/Pulseless VT	IIb			IND	IND	IIb
Wide-complex tachycardia	IIb					IIb
Stable VT	IIb			IIb		IIa
PSVT (preserved cardiac function) IIa		IIa	I	I		
PSVT (impaired cardiac function)		IIb				
Atrial fibrillation/flutter IIa (preserved cardiac function)		IIa	I	I		
Atrial fibrillation/flutter (impaired cardiac function)		IIb		IIb		
Atrial fibrillation/flutter (WPW)	IIb	III	III			IIb
Atrial fibrillation/flutter (impaired cardiac function plus WPW)		IIb				

Tachyarrhythmic Agents

Drug/Recommeded Use (Class)	Amiodarone	β-Blocker	Ca-Blocker	Lidocaine	Magnesium	Procainamide
VF/Pulseless VT	IIb			IND	IND	IIb
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PSVT (preserved cardiac function) IIa		IIa	I	I		
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Atrial fibrillation/flutter IIa (preserved cardiac function)		IIa	I	I		
Atrial fibrillation/flutter (impaired cardiac function)		IIb		IIb		
Atrial fibrillation/flutter (WPW)	IIb	III	III			IIb
Atrial fibrillation/flutter (impaired cardiac function plus WPW)		IIb				

Tachyarrhythmic Agents

Drug/Recommeded Use (Class)	Amiodarone	β-Blocker	Ca-Blocker	Lidocaine	Magnesium	Procainamide
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PSVT (preserved cardiac function) IIa		IIa	I	I		
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Atrial fibrillation/flutter IIa (preserved cardiac function)		IIa	I	I		
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Atrial fibrillation/flutter (WPW)	IIb	III	III			IIb
Atrial fibrillation/flutter (impaired cardiac function plus WPW)		IIb				

Tachyarrhythmic Agents

Drug/Recommeded Use (Class)	Amiodarone	β-Blocker	Ca-Blocker	Lidocaine	Magnesium	Procainamide
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PSVT (impaired cardiac function)		IIb				
Atrial fibrillation/flutter IIa (preserved cardiac function)		IIa	I	I		
Atrial fibrillation/flutter (impaired cardiac function)		IIb		IIb		
Atrial fibrillation/flutter (WPW)	IIb	III	III			IIb
Atrial fibrillation/flutter (impaired cardiac function plus WPW)		IIb				

Tachyarrhythmic Agents

Drug/Recommeded Use (Class)	Amiodarone	β-Blocker	Ca-Blocker	Lidocaine	Magnesium	Procainamide
VF/Pulseless VT	IIb			IND	IND	IIb
Wide-complex tachycardia	IIb					IIb
Stable VT	IIb			IIb		IIa
PSVT (preserved cardiac function) IIa		IIa	I	I		
PSVT (impaired cardiac function)		IIb				
Atrial fibrillation/flutter IIa (preserved cardiac function)		IIa	I	I		
Atrial fibrillation/flutter (impaired cardiac function)		IIb		IIb		
Atrial fibrillation/flutter (WPW)	IIb	III	III			IIb
Atrial fibrillation/flutter (impaired cardiac function plus WPW)		IIb				

Tachyarrhythmic Agents

Drug/Recommeded Use (Class)	Amiodarone	β-Blocker	Ca-Blocker	Lidocaine	Magnesium	Procainamide
VF/Pulseless VT	IIb			IND	IND	IIb
Wide-complex tachycardia	IIb					IIb
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PSVT (preserved cardiac function) IIa		IIa	I	I		
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Atrial fibrillation/flutter IIa (preserved cardiac function)		IIa	I	I		
Atrial fibrillation/flutter (impaired cardiac function)		IIb		IIb		
Atrial fibrillation/flutter (WPW)	IIb	III	III			IIb
Atrial fibrillation/flutter (impaired cardiac function plus WPW)		IIb				

Other Minor Changes

- ETT Placement
- EMS EKG
- Isoproterenol
- PEA
- Biphasic (BTE) Waveform Defibrillators

Summary

- Amiodarone dominates the management of tachycardias
- Lidocaine is no longer an agent of choice for stable VT or for VF
- High-dose epinephrine is no longer recommended
- Vasopressin has replaced epinephrine
- Adenosine has been removed from the WCT algorithm
- Stable VT can now be managed with immediate cardioversion

Summary

- The approach to A Fib/A flutter has become more nuanced with attention to stability, EF, and duration of the arrhythmia

- Bretylium has been removed from the algorithms

- For tachyarrhythmias the focus now is on picking one agent (e.g. amiodarone) and sticking with it, instead of multiple agents used in a stepwise fashion (e.g. lidocaine, then procainamide, then bretylium, etc.).

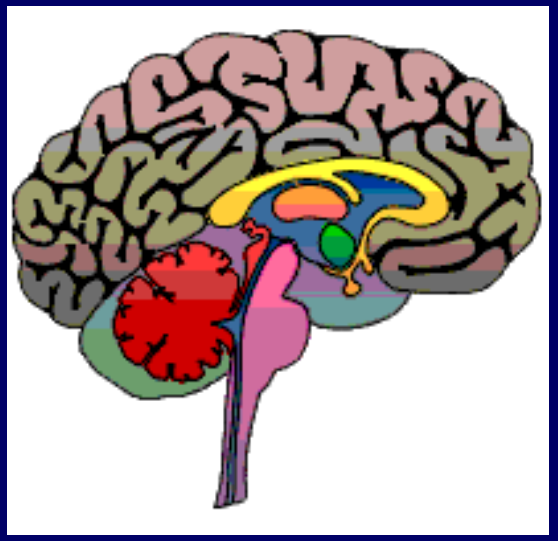
- Isoproterenol is no longer recommended for bradycardia

Summary

- ETT placement must now be confirmed by nonphysical exam techniques (e.g. $ETCO_2$ detectors)

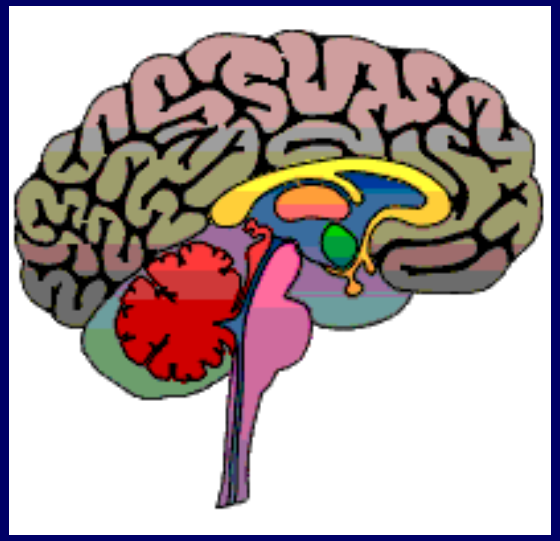
- The prehospital ECG
- PEA
- Biphasic (BTE) Waveform Defibrillators

Questions?



CPR = Cerebral Perfusion Resuscitation

Questions?



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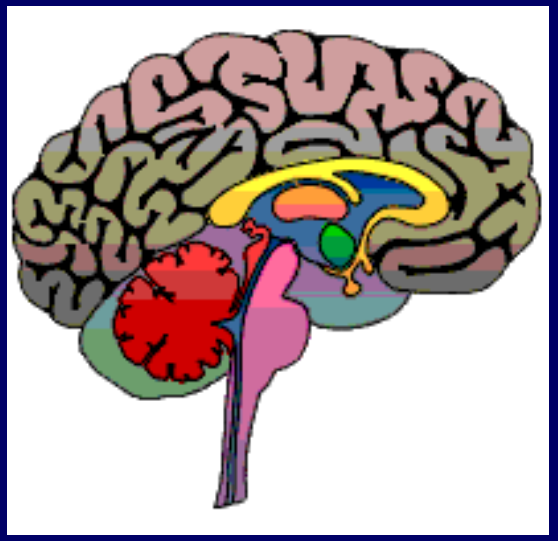

CPR = Cerebral Perfusion Resuscitation